City of Visalia, California

CLIMATE ACTION PLAN

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Prepared for the City of Visalia, CA

by

Strategic Energy Innovations

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EXECUTIVE SUMMARY

Overwhelming scientific agreement throughout the world clearly indicates that human-induced climate change is real and is happening now. Although climate change is a global phenomenon, its impacts are being felt regionally and locally. Higher levels of carbon dioxide (CO2) and other greenhouse gases (GHGs) which cause climate change will have lasting impacts on the San Joaquin Valley and the City of Visalia's health, water, agriculture, ecosystems and future prosperity.

- Climate change is expected to result in more variable weather patterns throughout California. More variability can lead to longer and more severe droughts in the summer and more flooding in the winter and spring.
- California's mountain snowpack monitored over the past 150 years is shrinking. The California Department of Water Resources predicts a 25% decrease in Sierra snowpack by 2050. The Sierra snowpack is critical to San Joaquin Valley water supplies.
- Higher temperatures increase the formation of ground level ozone and particulate matter, making it more difficult to meet health-based air quality standards for these pollutants. Ground-level ozone has been shown to aggravate existing respiratory illnesses such as asthma, reduce lung function, and induce respiratory inflammation. Ambient ozone also reduces agricultural crop yields and impairs ecosystem health.
- Warmer temperatures resulting in drying and increased winds could mean hotter, harder-to-control catastrophic wildfires in the Sierra and foothills. These wildfires could result in increased levels of fine particulate matter that could also exceed state and federal standards and harm public health.
- Potential impacts, such as reduced water supply, more severe droughts, more winter floods, and drier growing seasons will affect agriculture. Warmer temperatures and fewer frost days are anticipated to exacerbate pest problems. Changes in the timing of seasons and fewer frost days will impact the types of crops that can be grown.
- Changes in temperature and precipitation patterns would also shift California's current climate zones, and thus habitats associated with these zones, northward by approximately 100 - 400 miles, as well as upwards in elevation by 500-1,500 feet. Species distribution would move geographically as the climate changes, with forest stands, woodlands and grassland species predicted to move northward and higher in elevation. The entire vegetative community, including Visalia's iconic Valley Oaks, may be affected if non-native invasive species occupy sites and replace native plants.

With this understanding, state and local governments throughout the country are taking the initiative to confront climate change head-on. The City of Visalia has already undertaken a number of actions in energy efficiency/conservation and clean energy which have reduced GHG emissions. In January 2007, the Visalia City Council authorized the Mayor to sign the U.S. Mayors "Cool Cities" Climate Protection Agreement, which sets the goal of reducing City-wide CO2 emissions.

Utilizing existing GHG emissions inventory resources, this Climate Action Plan (CAP) was created to help guide the development and enhancement of actions designed to reduce Visalia's GHG emissions. This CAP includes the GHG emissions inventory for 2005, the selected baseline year. The inventory consists of estimates of GHG emissions from all sectors within Visalia ("Community"), and a more detailed inventory of GHG emissions due solely to City government operations ("Municipal").

For the emissions inventory, the various GHGs are estimated in terms of metric tons of carbon dioxide equivalent (CO2e). Visalia's community emissions level in 2005 was estimated to be **906,337 metric tons CO2e**. The municipal emissions in 2005 equaled about **16,446 metric tons CO2e.** The results are summarized in Table 1 and Table 2 below.

Table 1: Visalia's 2005 Community Emissions Summary by Sector

Community Sectors	% CO2e of All Sectors
Transportation	55%
Commercial / Industrial	23%
Residential	22%
Solid Waste	-1%
TOTAL	**100%**

Table 2: Visalia's 2005 Municipal Operations Emissions by Sector

Local Government Sectors	% CO2e of All Municipal Emissions
Water/Wastewater	28%
Transit Fleet	23%
Vehicle Fleet	23%
Buildings/Facilities	11%
Employee Commute	9%
Streetlights & Traffic Signals	7%
Airport Facilities	0.6%
Solid Waste	0%
TOTAL	**100%**

The City selected the years 2020 and 2030 to establish mitigation targets for this CAP. Executive Order S-3-05 by the Governor of the State of California established that the State would "…by 2050, reduce GHG emissions to 80 percent below 1990 levels."[1] The City of Visalia established two mitigation milestones to correlate with the planning horizon of the 2030 General Plan Update

[1] Executive Order S-3-05, Last updated April 25, 2012 <http://www.dot.ca.gov/hq/energy/ExecOrderS-3-05.htm>

(GPU), and to ensure that the City is conscious of and working towards the State's goal of an 80% reduction below baseline by 2050. Projected increases in GHG emissions from the 2005 baseline to 2020 and to 2030 were forecasted based on two scenarios: 1) business-as-usual (BAU) projection, which assumes no implementation of additional emissions reduction measures, and 2) emissions projection that takes into account some of the State of California's most impactful emissions reduction measures (Select State Measures). The Select State Measures are:

- Renewable Portfolio Standard (33% by 2020 and 51% by 2030)
- California Light-Duty Vehicle GHG Standards
- Low Carbon Fuel Standard
- Energy Efficiency (Title 24)
- Electric Vehicle promotion and charging infrastructure

Visalia's community emissions are projected to increase by 34% under the BAU scenario and 1% under the Select State Measures scenario from 2005 levels (Table 3) through 2020. In 2030, Visalia's community emissions are projected to increase by 54% under the BAU scenario and -11% under the Select State Measures scenario from 2005 levels (Table 4). Visalia's municipal operations emissions are projected to increase by 68% under the BAU scenario and 31% under the State Select Measures scenario (Table 5). In 2030, Visalia's municipal emissions are projected to increase by 84% under the BAU scenario and 25% under the Select State Measures scenario from 2005 levels (Table 6).

Table 3: 2020 Emissions Projections for Visalia's Community Sector

Sector	Baseline Year	Business-As-Usual Emissions Projections		Emissions Projections with Select State Measures	
	2005 Emissions (MT CO2e)	2020 Emissions (MT CO2e)	% Change from 2005 to 2020	2020 Emissions (MT CO2e)	% Change from 2005 to 2020
Residential	203,453	299,002	47%	230,851	13%
Commercial / Industrial	210,634	279,153	33%	196,208	-7%
Transportation	500,112	646,255	29%	496,840	-1%
Solid Waste	-7,862	-10,973	40%	-10,973	40%
TOTAL	**906,337**	**1,213,437**	**34%**	**912,926**	**1%**

Table 4: 2030 Emissions Projections for Visalia's Community Sector

Sector	Baseline Year	Business-As-Usual Emissions Projections		Emissions Projections with Select State Measures	
	2005 Emissions (MT CO2e)	2030 Emissions (MT CO2e)	% Change from 2005 to 2030	2030 Emissions (MT CO2e)	% Change from 2005 to 2030
Residential	203,453	386,499	90%	264,374	30%
Commercial / Industrial	210,634	324,732	54%	194,494	-8%
Transportation	500,112	696,551	39%	357,890	-28%
Solid Waste	-7,862	-13,458	71%	-13,458	71%
TOTAL	**906,337**	**1,394,323**	**54%**	**803,300**	**-11%**

Table 5: 2020 Emissions Projections for Visalia's Municipal Sector

Sector	Baseline Year	Business-As-Usual Emissions Projections		Emissions Projections with Select State Measures	
	2005 Emissions (MT CO2e)	2020 Emissions (MT CO2e)	% Change from 2005 to 2020	2020 Emissions (MT CO2e)	% Change from 2005 to 2020
Buildings / Facilities	1,727	2,252	30%	1,553	-10%
Streetlights & Traffic Lights	1,150	1,605	40%	1,016	-12%
Water / Wastewater	4,554	12,578	176%	9,331	105%
Vehicle Fleet	3,761	4,559	21%	3,876	3%
Transit Fleet	3,793	4,901	29%	4,496	19%
Airport Facilities	101	141	40%	92	-9%
Employee Commute	1,416	1,610	14%	1,180	-17%
Solid Waste	-56	-64	14%	-64	14%
TOTAL	**16,446**	**27,583**	**68%**	**21,479**	**31%**

Table 6: 2030 Emissions Projections for Visalia's Municipal Sector

Sector	Baseline Year	Business-As-Usual Emissions Projections		Emissions Projections with Select State Measures	
	2005 Emissions (MT CO2e)	2030 Emissions (MT CO2e)	% Change from 2005 to 2030	2030 Emissions (MT CO2e)	% Change from 2005 to 2030
Buildings / Facilities	1,727	2,630	52%	1,437	-17%
Streetlights & Traffic Lights	1,150	1,968	71%	890	-23%
Water / Wastewater	4,554	13,674	200%	8,844	94%
Vehicle Fleet	3,761	4,869	29%	3,709	-1%
Transit Fleet	3,793	5,283	39%	4,616	22%
Airport Facilities	101	173	71%	83	-18%
Employee Commute	1,416	1,703	20%	965	-32%
Solid Waste	-56	-67	20%	-67	20%
TOTAL	**16,446**	**30,233**	**84%**	**20,476**	**25%**

Based on the 2005 GHG emissions inventory and 2020 and 2030 emissions projection estimations, the following reduction targets are recommended for Visalia:

Community and Municipal Sectors:

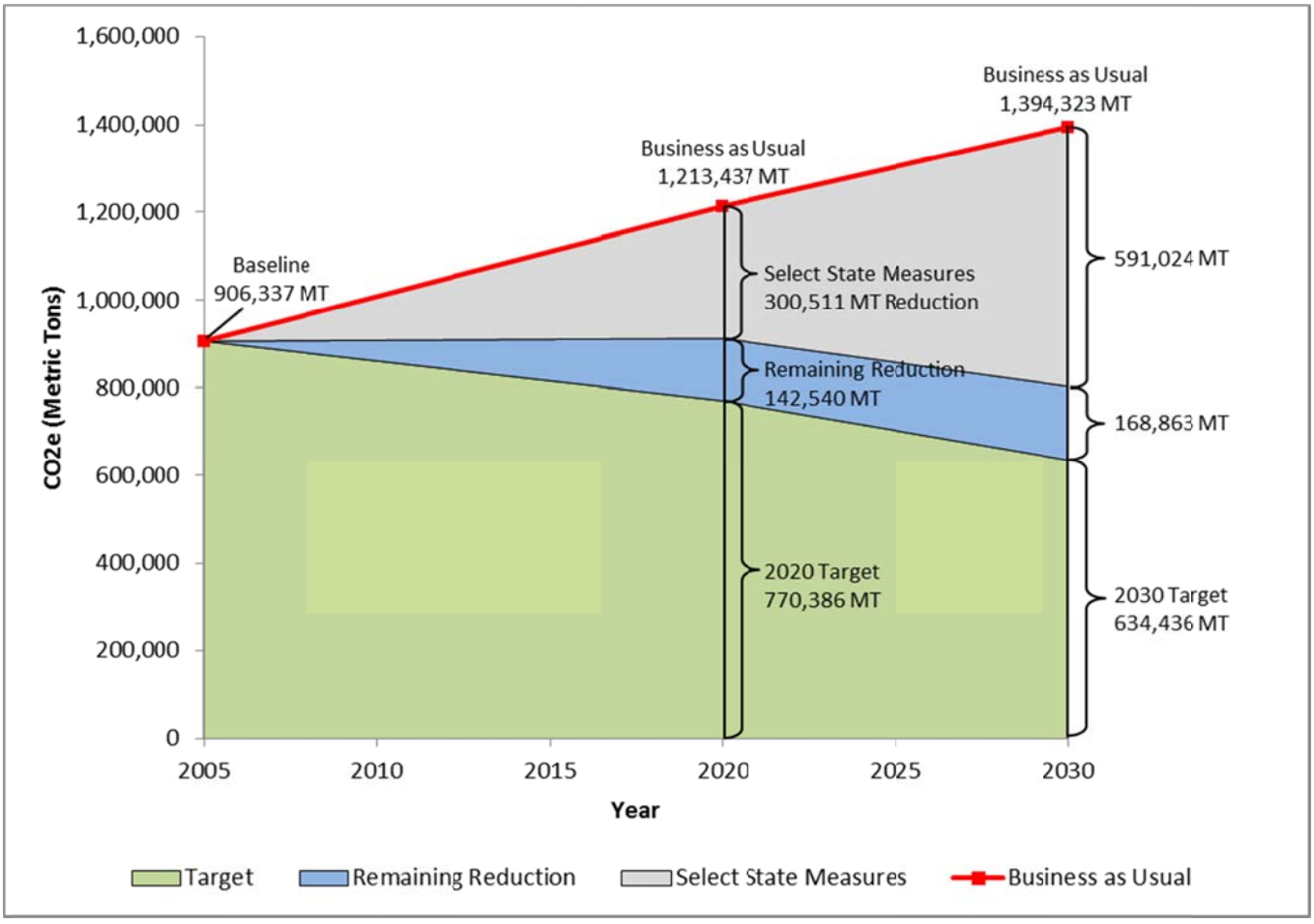
A reduction target of 15% below 2005 baseline year level by 2020
(ARB's recommended reduction target)

A reduction target of 30% below 2005 baseline year level by 2030
(Strategy consistent with Executive Order S-3-05))

The 2020 target is based on the voluntary emissions reduction target recommended by the California Air Resources Board (ARB) in the Scoping Plan (December 2008) - *15% below 2005 levels by 2020*. The City has also established a 2030 reduction target of 30% below 2005 emissions levels to correlate with the planning horizon of the General Plan update, and to establish a strategy for working towards the State's goal of 80% mitigation below baseline by 2050[2].This Climate Action Plan provides the mitigation strategies required to achieve the 2020 and 2030 mitigation targets. The following Figure 1 provides a summary of the projected business-as-usual (BAU) greenhouse gas (GHG) emissions through **2020** and **2030** for the community sector the required level of mitigation to achieve the GHG mitigation targets.

[2] Executive Order S-3-05 by the Governor of the State of California

Figure 1
Visalia Community Greenhouse Gas Emissions and the 2020 & 2030 Mitigation Target (MTCO2e)

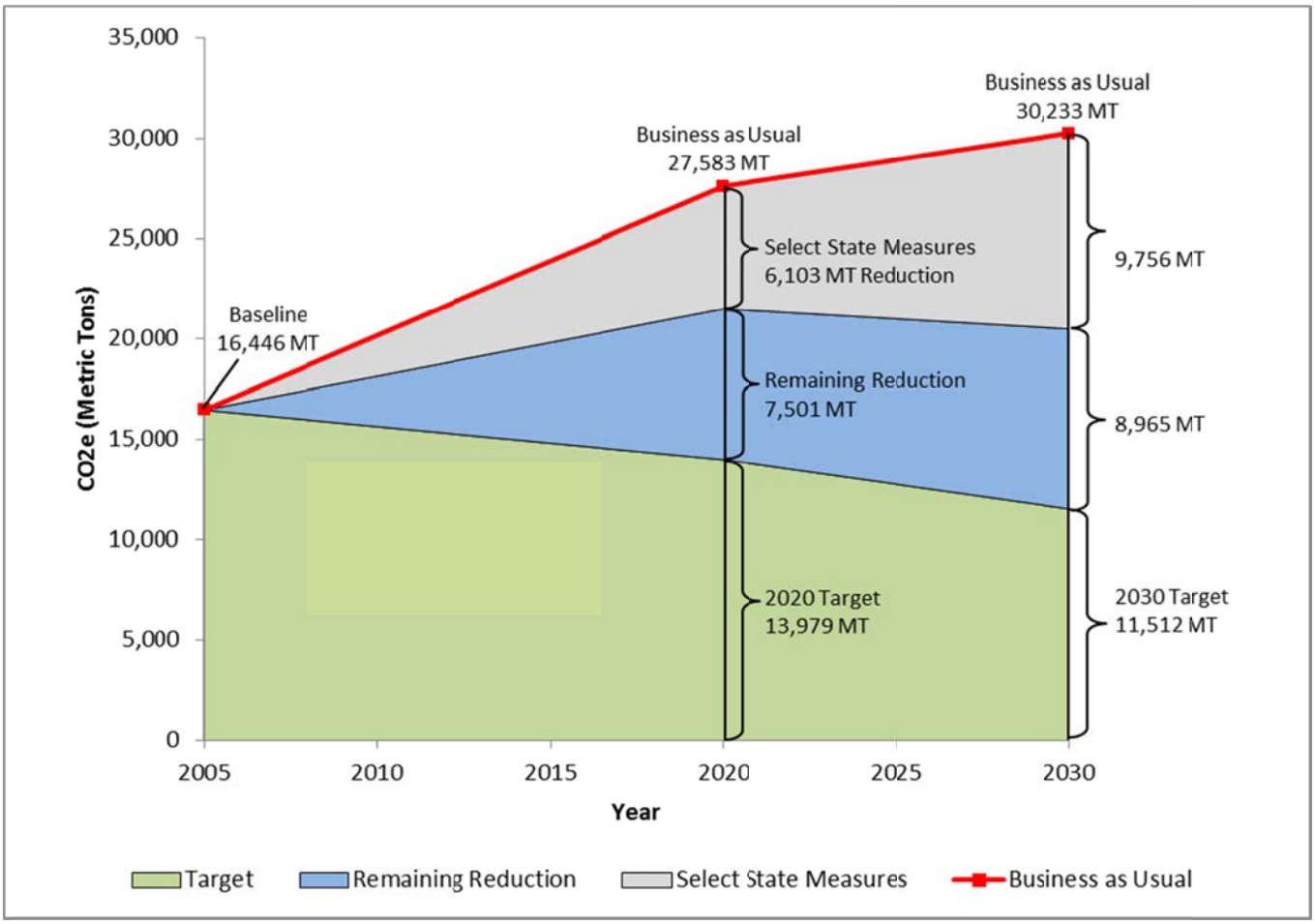


For Visalia's community, the recommended reduction target of reducing 15% emissions below the 2005 emissions level by **2020** equates to a total required reduction of **443,051 MT CO2e** from the BAU baseline. The City has identified various mitigation measures, which when implemented in conjunction with the Select State Measures, result in total emissions reductions of **445,841 MT CO2e**, or **101%**, of what is needed to achieve the recommended 2020 reduction target for the community. The breakdown of emissions reductions are summarized in Figure 3.

Visalia's recommended **2030** community reduction target of reducing 30% below 2005 emissions level equates to a required reduction of **759,887 MT CO2e** below the 2030 BAU projection. Through the implementation of numerous existing and proposed measures, and the Select State Measures, the community sector would achieve combined emissions reductions **of 821,058 MT CO2e**, or **108%** of what is needed to achieve the recommended **2030** reduction target for the community.

The following Figure 2 provides a summary of the projected business-as-usual (BAU) greenhouse gas (GHG) emissions through **2020** and **2030** for the municipal sector the required level of mitigation to achieve the GHG mitigation targets.

Figure 2
Visalia Municipal Greenhouse Gas Emissions and the 2020 & 2030 Mitigation Target (MTCO2e)



To achieve the **2020** recommended municipal emissions reduction target of 15% below 2005 emissions levels, a reduction of **13,604 metric tons of CO2e** from the BAU baseline is required. Existing municipal measures and the Select State Measures will result in a total reduction of **14,015 MT CO2e** or **103%** of what is needed to achieve the recommended 2020 municipal reduction. The breakdown of emissions reductions are summarized in Figure 3.

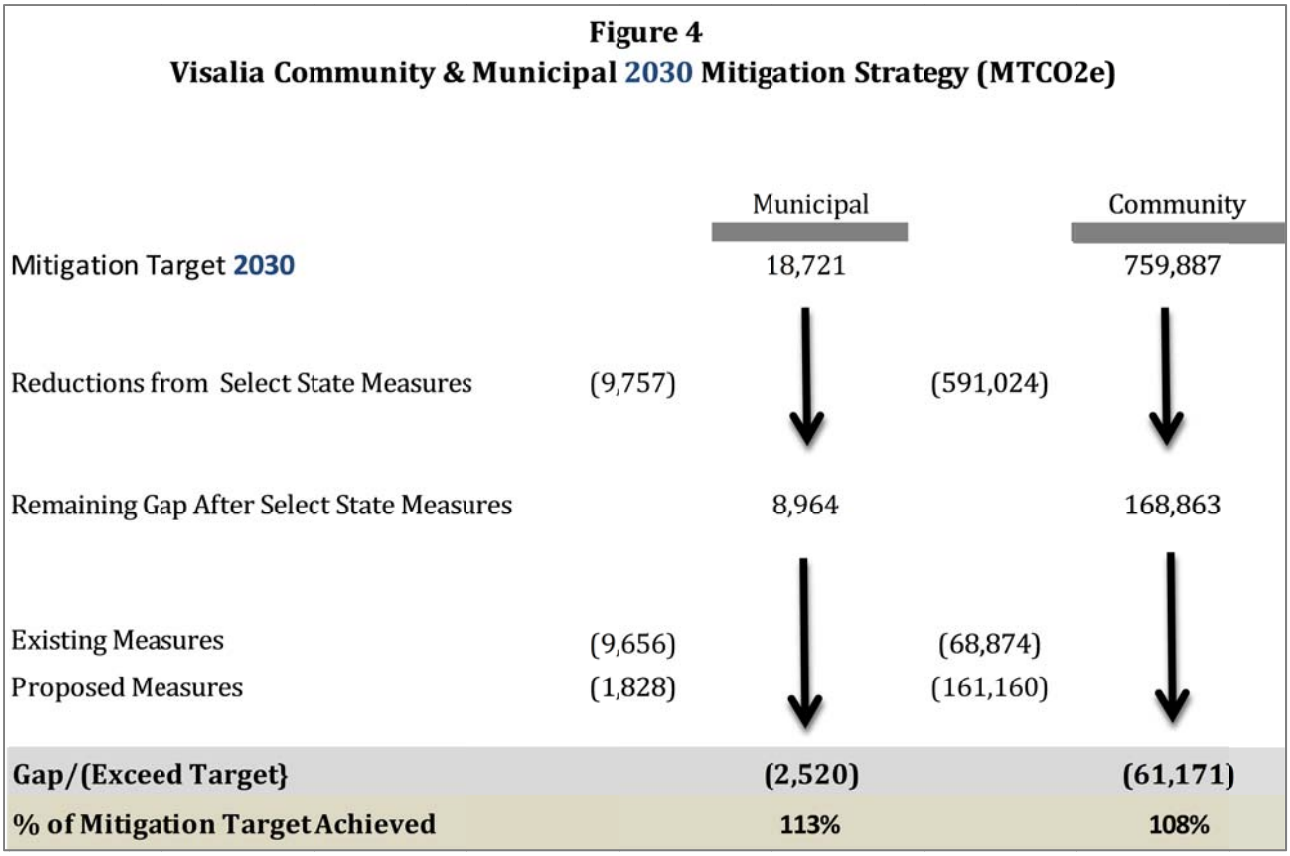
The reduction target established for the year **2030** in the municipal sector is 30% below 2005 emissions level. To reach this target, a total reduction of **18,721 MT CO2e** will need to be achieved. Through the implementation of existing and new municipal measures and Select State Measures a total reduction of **21,241 MT CO2e** will be achieved, or **113%** of what is needed to achieve the recommended municipal reduction target for **2030**.

Figures 3 and 4 below summarize the baseline BAU projections through 2020 and 2030, and the mitigation projected to result from the Select State Measures, existing measures, and proposed community and municipal measures.

Figure 3
Visalia Community & Municipal 2020 Mitigation Strategy (MTCO2e)

		Municipal		Community
Mitigation Target 2020		13,604		443,051
Reductions from Select State Measures	(6,104)	↓	(300,511)	↓
Remaining Gap After Select State Measures		7,500		142,540
Existing Measures	(7,015)	↓	(55,617)	↓
Proposed Measures	(896)		(89,713)	
Gap/(Exceed Target}		**(411)**		**(2,790)**
% of Mitigation Target Achieved		**103%**		**101%**

Figure 4
Visalia Community & Municipal 2030 Mitigation Strategy (MTCO2e)



It is important to note that reduction targets are not absolute; adopted reduction targets should be modified as needed based on periodic inventory updates and changes in municipal operations and community activities. In addition, the Select State Measures and evolving climate change legislation have a notable impact on mandated and selective approaches to mitigating GHG emissions, and should be factored into future updates to Visalia GHG mitigation targets and portfolio of mitigation measures.

Since 2005, the City has implemented and will continue to implement various reduction measures for both the community and municipal sectors through 2020 and 2030 ("Existing Community Measures"). In the community sector, mitigation measures include the expansion of the City's Bicycle Plan to the implementation of a food scraps composting program. Combined, these measures account for about **55,617 MT CO2e** reduction, or **12%** towards Visalia community's recommended reduction goal of 15% below 2005 emissions level by 2020. By the year 2030, Visalia community measures account for about **68,874 MT CO2e** reduction, or **8%** towards Visalia community's recommended goal of 30% below 2005 emissions level by 2030. Details of the community existing measures are provided in the Table 7 below.

Table 7: Summary of Visalia's Existing Community Measures

Action Category	Existing Actions	2020 Potential CO2e Emissions Reduction (metric tons)	2030 Potential CO2e Emissions Reduction (metric tons)
Energy	1. Solar Photovoltaic (PV) Institutional Barrier Removal	523	676
	2. Solar PV Installations	9,115	11,782
	3. Energy Upgrade CA	365	472
	4. Southern California Edison Small Business Direct Install Program	11,843	15,309
	5. Southern California Gas Weatherization Program	2,393	3,093
	6. CSET Weatherization Program	784	1,013
	7. Urban Forestry	3,384	5,802
	8. Compact Fluorescent Light (CFL) Bulbs: Encourage the use of CFLs throughout the community.	14,524	14,715
Transportation	9. Sequoia National Park Shuttle Bus	149	193
	10. Bicycle Path Expansion	20	26
	11. Vi-Cycle Pilot Program	8	10
	12. Dare to Spare Program	0	1
	13. Increase in Transit Ridership (City Transit Buses)	1,183	1,529
	14. Traffic Light Synchronization	2,561	2,923
Waste and Resource Conservation	15. Waste-to-Energy Program	493	637
	16. Construction & Demolition Recycling	8,051	10,407
	17. Yard Waste / Food Scrap Composting	221	286
TOTAL		**55,617**	**68,874**

Similarly, Visalia's municipal sector has also implemented numerous reduction measures within recent years and will continue to expand measures into 2020 and 2030. These measures range from LED traffic and pedestrian lighting retrofits to compressed natural gas (CNG) transit buses and fleets. These measures already account for a **7,014 MT CO2e reduction,** or **50%** towards Visalia's recommended municipal operations reduction goal of 15% below 2005 emissions levels by 2020. These measures also contribute **9,656 MT CO2e** reduction, or **45%** towards Visalia's recommended municipal operations reduction goal of 30% below 2005 emissions levels by 2030. Details of municipal existing measures are provided in Table 8 below.

In addition to the existing measures already underway in Visalia, this CAP includes a suite of proposed measures for the municipal and community sectors to mitigate additional GHG emissions. The proposed measures have been recommended based on the high likelihood of implementation, and when combined with Select State Measures and existing mitigation measures, provide a strategy for Visalia to achieve the 2020 and 2030 mitigation targets. A complete summary of the proposed community and municipal measures are provided in Table 9 (Community Sector) and Table 10 (Municipal Sector).

Table 8: Summary of Visalia's Existing Municipal Operations Measures through 2030

Action Category	Existing Actions	2020 Potential CO2e Emissions Reductions (metric tons)	2030 Potential CO2e Emissions Reductions (metric tons)
Energy	1. Facility Lighting Upgrades (Convention Center Exhibit Hall, East Parking Structure, and West Parking Structure)	117	117
	2. Police Substations	3	4
	3. HVAC Upgrades	20	20
	4. Plug Load Occupancy Sensors	12	12
	5. Lighting and Equipment Upgrades (California Energy Commission Loan)	284	1,756
	6. LED Traffic & Pedestrian Lights	69	89
	7. Water Pump Upgrades	8	8
	8. Airport - Solar PV	14	14
	9. Bus Shelters - Solar PV	1	1
	10. Transit Center - Solar PV	2	3
	11. Water Conservation Plant Renewable Energy Systems - Solar PV and Microturbines	2,366	2,366
Transportation	12. CNG Vehicles (combined)	3854	4,981
	13. Hybrid Electric Sedans	264	284
TOTAL		**7,014**	**9,656**

Table 9: Summary of Visalia's Proposed Community Measures through 2030

Action Category	Proposed Actions	2020 Potential CO2e Emissions Reduction (metric tons)	2030 Potential CO2e Emissions Reduction (metric tons)
Energy	1. ENERGY STAR Appliances & Equipment:	4,226	5,463
	2. Community-wide Solar PV Bulk Purchasing	142	184
	3. Property Assessed Clean Energy (PACE) Program	21,951	52,942
	4. Energy Efficiency Marketing & Programs	12,045	13,839
	5. Visalia Unified School District (VUSD) Solar Program.	2,260	2,260
Water and Resource Conservation	6. Water Efficient Landscaping Policy	1,520	1,965
	7. Water Efficient Landscaping Promotion and Education.	760	982
Transportation / Land Use	8. Transit Oriented Development	6,962	8,999
	9. Electric Vehicle promotion, including Plug-in Electric Vehicle (PEV) Charging Stations	7,940	33,707
	10. Local, Low-Carbon Transportation Education	2,569	3,321
	11. Infill and Higher Density Development	16,006	20,335
	12. CNG Public Fueling Stations	3,340	5,204
Waste and Resource Conservation	13. Anaerobic Digestion	9,991	11,959
TOTAL		**89,712**	**161,160**

Table 10: Summary of Visalia's Proposed Municipal Operations Measures through 2030

Action Category	Proposed Actions	2020 Potential CO2e Emissions Reduction (metric tons)	2030 Potential CO2e Emissions Reduction (metric tons)
Energy	1. ENERGY STAR Appliances & Equipment	12	14
	2. SCE-Owned Streetlight Retrofit	275	356
	3. Solar Photovoltaic (PV	586	1,431
Transportation	4. Procurement of Smaller/High Fuel Efficiency Vehicles	22	28
TOTAL		**896**	**1,828**

The proposed measures detailed in this CAP represent an initial analysis of the various actions that Visalia can implement to mitigate GHG emissions. With the expansion of current emission reduction tools and resources and the emergence of new ones, we highly encourage the City to revisit this initial list periodically to expand and modify it appropriately to reflect the changes within the City and the community. Additionally, the list of community measures should be monitored to ensure the City and community meet the specified reduction goal of 15% below 2005 emissions level by 2020 (443,051 metric tons CO2e total reduction) and the reduction goal of 30% below 2005 emissions level by 2030 (759,887 metric tons CO2e total reduction).

This CAP for the City of Visalia was created as a launching pad and guideline for helping the City identify GHG emissions sources, set emissions reduction goals specific to Visalia's objectives, and begin prioritizing strategies to achieve those goals. This CAP represents the results of a GHG emissions inventory effort conducted by Strategic Energy Innovations (SEI), which served as a starting point for the development of a comprehensive municipal and community strategy for addressing GHG emission reduction goals.

In addition to adopting the CAP, it is highly encouraged that the City establish a system for monitoring the implementation of the selected new measures and adjust the plan as opportunities arise. Moreover, re-inventorying of Visalia's GHG emissions on a regular basis (e.g. every 3-5 years) is recommended to allow the City to track progress toward local emissions reduction targets and identify opportunities to integrate new or improved measures into its emissions reduction plan.

1. INTRODUCTION

As climate change becomes increasingly evident and state regulations authorize local governments with responding to climate change, addressing climate change is increasingly becoming one of the top priorities for many local governments throughout California. Through adoption of AB 32, the Global Warming Solutions Act of 2006, the 2020 greenhouse gas emissions reduction goal was set into law. A key tool utilized by local governments to mitigate greenhouse gas (GHG) emissions is the development of a Climate Action Plan (CAP).

A CAP represents a proactive approach to climate protection. It enables local governments to build the necessary framework to address climate change by laying out their goals and defining their commitments to climate protection and sustainability. Specifically, a CAP provides an assessment of existing and projected greenhouse gas (GHG) emissions (e.g., the gases that are directly contributing to climate change). A CAP also provides an assessment of the potential actions required to reduce GHG emissions within a community so that they come in line with the reductions required to meet specified targets. In addition to setting the necessary framework, a CAP also helps identify and assess in a transparent way which policies are feasible and effective to implement. In this way it helps generate buy-in for local governments to reduce their carbon footprint through a combination of public and private sector policies and programs.

This CAP for the City of Visalia was created as one of the first key steps to guide the development and enhancement of actions designed to reduce Visalia's GHG emissions. This CAP represents the results of a GHG emissions inventory effort conducted by Strategic Energy Innovations (SEI), which served as a starting point for the development of a comprehensive municipal and community strategy for addressing GHG emission reduction goals. As such, it is worth emphasizing the main objectives of this CAP; namely, to serve as the launching pad and guideline for helping the City with the following:

- Identify and understand the sources of GHG emissions within the City;
- Provide an estimated forecast of how those emissions may grow over time;
- Recommend GHG emissions reduction goals specific to Visalia's own objectives;
- Document the steps the City has already taken towards addressing climate change; and
- Recommend potential new strategies that the City could implement to further reduce GHG emissions.

The major long-term objectives of this CAP for the City government and the community as a whole include the following:

- Reduce net GHG emissions from both municipal operations and community activities;
- Promote cleaner and healthier air to breathe;
- Help the City and its residents save on energy costs;
- Reduce vulnerability to changes in energy availability and price; and
- Increase public awareness of climate change issues.

The City selected the years 2020 and 2030 to establish mitigation targets for this CAP. The City of Visalia established two mitigation milestones to correlate with the planning horizon of the 2030

General Plan Update (GPU), and to ensure that the City is conscious of and working towards the State's goal of an 80% reduction below baseline by 2050.[3]

1.1 Climate Change[4]

A balance of naturally occurring gases dispersed in the atmosphere determines the Earth's climate by trapping solar radiation. This phenomenon is known as the *greenhouse effect*. Modern human activity, most notably the burning of fossil fuels for transportation and electricity generation, introduces large amounts of carbon dioxide (CO2) and other heat-trapping gases into the atmosphere. Atmospheric CO2 concentrations have increased by almost 40% since pre-industrial times, from approximately 280 parts per million by volume (ppmv) in the 18th century to 393 ppmv in 2012.[5]The current CO2 level is higher than it has been in at least 800,000 years.[6] Collectively, these heat-trapping gases, also known as *greenhouse gases (GHG)*, intensify the natural greenhouse effect, causing global average surface temperature to rise, which is in turn expected to affect global climate patterns. For instance, scientific evidence suggests that the planet today is warmer than it has been during 70 to 80% of the time over the last 11,300 years. By 2100, temperatures will exceed the warmest temperatures during that 11,300-year period under all plausible greenhouse gas emission scenarios evaluated by the Intergovernmental Panel on Climate Change (IPCC).[7]

This unprecedented increase in global average temperature has serious consequences for all life on earth. Currently, research has identified impacts that include the melting/reduction of ice and snowpack, rising sea levels, increased frequency and intensity of catastrophic storms, increased wild fires, shifting ecological zones, the spread of tropical diseases and illnesses into higher latitudes, and related impacts to agricultural, social, and economic systems.

Overwhelming evidence suggests that this increase in emissions is the result of human activities, particularly the burning of fossil fuels such as coal, natural gas, and petroleum, as well as deforestation and methane emitted from landfills and animal waste.

Representing less than five percent of the world's population, the United States is responsible for 21 percent of the world's CO2 emissions[8]. Arguably one of the most environmentally progressive entities in the world, when compared to other countries, California is the 12th to 16th largest GHG emitting entity in the world.[9] With so much at stake here in California, it is absolutely critical that immediate and aggressive actions be taken to reduce emissions.

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[3] Executive Order S-3-05, Last updated April 25, 2012 <http://www.dot.ca.gov/hq/energy/ExecOrderS-3-05.htm>
[4] In addition to sources cited, main source of reference is derived from City of San Rafael's GHG Emissions Inventory Report (2008) prepared by ICLEI for City of San Rafael.
[5] Globally averaged marine surface annual mean data, NOAA Earth System Research Laboratory, http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html.
[6] Source: NRC (2010). Advancing the Science of Climate Change . National Research Council. The National Academies Press, Washington, DC, USA.
[7] Source: Marcott, S., Shakun, J., Clark, P., Mix, A. A Reconstruction of Regional and Global Temperature for the Past 11,300 Years. Science. March 8, 2013. Vol. 339 no. 6124 pp. 1198-1201. http://www.sciencemag.org/content/339/6124/1198.abstract
[8] Source: http://www.solcomhouse.com/toptenco2.htm. Oak Ridge National Laboratory credited.
[9] Data are for total GHG emissions and include emissions from electricity imported into California, from World Resources Institute's Climate Analysis Indicators Tool. Strictly speaking, California was the sixteenth largest emitter of CO2 in 2002. Other estimates place the California ranking higher, and rankings as high as tenth are possible. Source: California Energy

1.2. Impacts on Visalia

Although climate change is a global phenomenon, its impacts are being felt regionally and locally. Higher levels of CO2 and other GHG will have lasting impacts for the San Joaquin Valley and the City of Visalia's health, air quality, water, agriculture, ecosystems and future prosperity. The following are examples of potential state, regional and local impacts taken from recent studies:

Health

- An increase in the frequency and severity of heat waves, which will result in a rise in heat related death and illness.
- Lowered air quality will exacerbate acute respiratory diseases, asthma, and decreased lung function in children[10].

Water

- Increased global temperatures will diminish snow accumulation in the Sierra snowpack, a major source of water for California. This will have a negative cascading impact on the already strained water supplies throughout Central California.
- Current studies conducted by the Scripps Institute of Oceanography project that with 3 - 5.4^{0}F warming, California's Sierra snowpack could see a reduction of 10-40% in its natural water storage capacity by 2035-2064. Even further warming could reduce the snowpack as much as by 70 to 90%.[11]
- The Kings, Kaweah, Tule, and Kern Rivers, which begin in the Sierras and are sustained by snowmelt from this snowpack, will dwindle in size and/or length, and may have more frequent flood events.

Economy

- Agriculture, which accounts for 80% of the water consumed in the Central Valley, is usually the first industry that is negatively impacted by drought and diminished water supplies. Increased reduction in water supplies as a result of climate change will certainly have a catastrophic impact on the agriculture economy of the entire Central Valley. For instance, high water demand crops such as alfalfa may no longer be sustainable with higher temperatures and depleting water resources brought on by climate change.

Ecosystems

- Forest fire seasons are likely to lengthen and the fire danger to forest areas such as the Sierra Nevada Mountains are likely to increase significantly[12].
- In an effort to self-conserve, the climate sensitive Valley Oaks will tend to move north towards cooler climates and will shrink to about 54% of their potential size range.[13]

Commission. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004. December 2006. http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-013-SF.PDF

[10] Source: California Climate Change Center, 2006: *Public Health-Related Impacts of Climate Change in California* [D.M. Drechsler and N. Motallebi] California Air Resources Board

[11] Source Cal-Adapt Snowpack Decadal Averages Map, http://cal-adapt.org/snowpack/decadal/

[12] Source: IPCC, Field, C.B., L.D. Mortsch, M. Brklacich, D.L. Forbes, P. Kovacs, J.A. Patz, S.W. Running and M.J. Scott, 2007: North America. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds.] Cambridge University Press, Cambridge, United Kingdom.

[13] Source: Proceedings of the National Academy of Sciences (Kueppers, Snyder, Sloan, Zavaleta and Fulfrost 2005). *Modeled regional climate change and California endemic oak ranges.*

- Higher temperatures could affect general plant growth by increasing their susceptibility to pests and diseases.[14]

Air Quality

- Higher temperature will increase air pollutants, such as ground level ozone and particulate matter, making it difficult to maintain healthy air quality standards. Ozone is shown to aggravate existing respiratory illness such as asthma and induce respiratory inflammation. Particulate matter has been implicated to exacerbate cardiovascular disease, asthma, and other respiratory diseases.[15]

1.3 Existing Climate Change Policies & Regulations

As a result of the mounting evidence that climate change is a real and pressing problem, various levels of government in the United States are implementing policies designed to reduce GHG emissions. Below is a summary of current policies.

1.3.1. National

The United States signed support for the Kyoto Protocol goals and targets in 1997, which would commit the country to reduce its GHG emissions by 7% below 1990 levels by 2012. However, the U.S. Congress has yet to ratify the Protocol stating that it will have detrimental impact on the U.S. economy. Although the federal government currently does not mandate legislative reduction targets for GHG emissions reductions, there has been some movement by the federal government over the last several years in climate protection.

National Fuel Economy Standards
The U.S. Department of Transportation (DOT) and the U.S. Environmental Protection Agency (EPA) in 2010 jointly established historic new federal rules that set the first-ever national GHG emissions standards and will significantly increase the fuel economy of model year 2010-2016 passenger cars and light trucks sold in the United States. The new set of national standards was a result of negotiations between the White House and the automobile manufacturers and fourteen states that sought to implement California's more stringent car and light truck emission standards. The agreement set a national program equivalent to the emissions stringency called for by California and thirteen other states, while offering automakers a single, national program under which to comply.[16] In August of 2012, the Obama Administration finalized legislation that will increase fuel economy to the equivalent of 54.5 miles per gallon for cars and light-duty trucks by the year 2025.[17]

U.S. EPA's GHG Reporting Program Implementation
On October 30, 2009, the U.S. EPA published a rule for the mandatory reporting of GHG from

[14] Source: California Climate Change Center (Luers and Cayan et. al 2006). *Our Changing Climate; Assessing the Risks to California*. Published by the University of California.
http://meteora.ucsd.edu/cap/pdffiles/CA_climate_Scenarios.pdf
[15] California State Climate Change Portal. Frequently Asked Questions about Global Climate Change.
http://www.climatechange.ca.gov/publications/faqs.html#iif
[16] Union of Concerned Scientists. National Clean Vehicle Program: Model Year 2012-2016 Standards.
http://www.ucsusa.org/assets/documents/clean_vehicles/National-Clean-Car-Standards-Fact-Sheet.pdf
[17] National Highway traffic Safety Administration: Fuel Economy.
http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/2017-25_CAFE_Final_Rule.pdf

sources that in general emit 25,000 metric tons or more of carbon dioxide equivalent per year in the United States. The ruling applies to direct GHG emitters, fossil fuel suppliers, industrial gas suppliers and facilities that inject CO2 underground for sequestration or other reasons. An estimated 85-90% of the total U.S. GHG emissions from over 8,000 facilities are covered by this ruling. Monitoring of GHG data began in 2010 for most emission sources and the first reports were submitted to the EPA in September 2011. An additional 21 source categories began collecting data in 2011 and submitted reports in September 2012.[18]

1.3.2. State of California

California was a leader in state level acceptance of the need to regulate climate change and has been at the forefront of efforts to define policies that will reduce GHG emissions. Most notable are the following state mandates:

Renewable Portfolio Standard (RPS)
Originally established in 2002, California's Renewable Portfolio Standard requires investor-owned utilities, electric service providers, and community choice aggregators to procure 33% of total energy from eligible renewable energy resources. Senate Bill 2 (2011) codified the RPS of 33% by 2020 into law. Assembly Bill 177 introduced by Assembly Member Manuel Pérez on January 24, 2013 is an act to add section 636 to the PUC Code relating to renewable energy resources: In a long-term plan adopted by an electrical corporation or in a procurement plan implemented by a local publicly owned electric utility, the electrical corporation or local publicly owned electric utility shall adopt a long-term procurement strategy to achieve a target of procuring 51 percent of its electricity products from eligible renewable energy resources by December 31, 2030, and to achieve the 2050 goal for reducing emissions of greenhouse gases adopted by the State Air Resources Board, consistent with Section 454.55[19].

Executive Order S-3-05 by the Governor of the State of California
On June 1, 2005 the Governor of the State of California signed Executive Order S-3-05, which established "That the following greenhouse gas emission reduction targets are hereby established for California: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80 percent below 1990 levels…"

Assembly Bill 32
In September 2006, Governor Schwarzenegger signed into law the landmark Assembly Bill 32 (AB 32), also known as the California Global Warming Solutions Act of 2006, which mandates that the State's GHG emissions be reduced to 1990 levels by 2020, a 25% reduction under business-as-usual estimates. In December 2008, the California Air Resources Board (ARB) developed the Proposed Scoping Plan, a comprehensive blueprint, which outlines the different approaches that the State will take in order to meet the 2020 reduction target set out by AB 32.

[18] U. S. EPA Greenhouse Gas Reporting Program Implementation Fact Sheet.
http://www.epa.gov/ghgreporting/documents/pdf/2009/FactSheet.pdf;
http://www.epa.gov/ghgreporting/ghgdata/index.html
[19] California Legislative Information. Accessed November 14, 2013.
http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB177

Assembly Bill 1493 ("Pavley Bill")
Sponsored by Assembly member Pavley and enacted in 2002, AB 1493 requires the ARB to develop and adopt regulations mandating reductions of tailpipe CO2 emissions from vehicles in California. In January 2009, the U.S. Environmental Protection Agency granted California and other states a waiver allowing the State to be able to significantly cut down its tailpipe emissions in the near future. California EPA officials estimate that the Pavley Bill will reduce GHG emissions by approximately 30 million metric tons by 2020 and over 50 million metric tons by 2030[20].

Senate Bill 375
SB 375 requires metropolitan planning organizations to include sustainable strategies in their regional transportation plans for the purpose of reducing GHG emissions, aligns planning for transportation and housing, and creates specified incentives for the implementation of the strategies.

Senate Bill 97
Enacted in 2007, SB 97 requires the California Governor's Office of Planning & Research (OPR) to develop and the Natural Resources Agency to adopt, amendments to the California Environmental Quality Act (CEQA) Guidelines addressing the analysis and mitigation of GHG emissions. In 2009, OPR submitted proposed amendments to the Natural Resources Agency. In 2010, the Office of Administrative Law approved the Amendments adopted by the Natural Resources Agency, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments went into effect on March 18, 2010.

Cap-and-Trade System
On January 1, 2013, California launched a carbon cap-and-trade system, which sets a mandatory, statewide limit on GHG emissions set by CARB and based on verified emissions data. That limit declines 2-3% year, ensuring the overall level of emissions statewide is steadily reduced. Large businesses that emit more than 25,000 metric tons of carbon dioxide are covered under the program. That includes 360 businesses representing 600 facilities across the state. In the first phase of the program (2013-2014), the cap covers electricity suppliers and large industrial sources such refineries and cement companies. After the first phase, the program will expand to include gasoline, diesel, and natural gas providers. California held its first auction for carbon permits in November 2012.

Title 24: Building Energy Efficiency Program
Title 24 Building Energy Efficiency standards conserve electricity and natural gas by enhancing California building standards such as building energy, plumbing and fire codes. On October 19, 2007, the California Public Utilities Commission (CPUC) adopted a target that all commercial buildings be energy neutral by 2030 and all homes built in California after 2020 be energy neutral. The State also adopted Title 24, Part 11 "California Green Building Standards Code" which is often commonly referred to as CalGreen.

[20] California Environmental Protection Agency – Air Resources Board.
http://www.arb.ca.gov/cc/ccms/factsheets/ccfaq.pdf

Low Carbon Fuel Standard
Adopted in 2007, California's Low Carbon Fuel Standard requires a 10 percent reduction in the carbon intensity of transportation fuels by 2020, as measured on a lifecycle basis. The National LCFS Study[21] performed by Institute of Transportation Studies at UC Davis, Department of Agriculture, University of Illinois, University of Maine, Oak Ridge National Lab, and recommends setting a target of reducing the carbon intensity of gasoline and diesel by 10 to 15 percent by 2030.

Electric Vehicle Incentives
There are a number of incentives in California to encourage Electric Vehicle (EV) adoption: Qualified EVs may use designated high-occupancy vehicle (HOV) lanes regardless of the number of occupants. The Clean Vehicle Rebate Project offers rebates for ARB qualified EVs. The Drive Clean! Rebate Program in the San Joaquin Valley Air Pollution Control District provides rebates for purchases of new EVs. There is free EV parking offered in various cities across the state. In addition, there are various regional and State planning efforts for EV charging infrastructure, including the San Joaquin Valley Plug-in Electric Vehicle (PEV) Readiness Plan.

1.3.3. City of Visalia

The City of Visalia has a vision to become a model green community for the San Joaquin Valley. With support from both City Management and the City Council, the City has enacted various projects, policies and regulations aimed at reducing GHG emissions over the years, as a means to demonstrate what can be accomplished by a proactive San Joaquin Valley.

One of the City's most notable initiatives is the "greening" of its vehicle and transit fleet. Beginning in 2002, with the construction of the City's compressed natural gas (CNG) fueling facility, the City began purchasing CNG vehicles to replace the gasoline-driven Dial-A-Ride buses. By Fall 2008, Visalia had replaced all Dial-A-Ride buses that serve the community with CNG buses. The decision to build a new CNG refueling facility prompted the additional purchases of CNG buses to replace the fixed route diesel-driven Visalia Transit buses. The City is in the process of converting all its solid waste trucks and downtown trolleys to run on CNG. Plans are in place to purchase additional CNG vehicles in the near future.

In addition to CNG, the City has proceeded in purchasing electric-hybrid vehicles to supplant administrative vehicles within every department once they reach the age or mileage warranting replacement.

To reduce GHG emissions from its facilities, the City conducted energy audits with the help of Southern California Edison in 2000. Upon completion of the audits, the City upgraded many of the HVAC systems for City buildings, replaced the majority of its lighting, and began installation of LED traffic and pedestrian lights. Additionally, two police substations were

[21] National Low Carbon Fuel Standard: Technical Analysis Report. July 19, 2012. http://nationallcfsproject.ucdavis.edu/files/pdf/2012-07-nlcfs-technical-analysis-report.pdf

constructed to be Leadership in Energy and Environmental Design (LEED) Silver equivalent.

To further reduce energy use from facilities, the City installed numerous renewable energy systems during the last several years, including a 30 kW solar photovoltaic (PV) system at the Visalia Airport, small solar PV systems (cumulative solar capacity of 40 W) on all its new bus shelters, and two 5 kW PV systems in its Transit Center. Additionally, for over 15 years, the City has operated a methane digester at the Water Conservation Plant, which generates enough electricity to satisfy a significant portion of the facility's energy demands. The City will be upgrading the Water Conservation Plant in the near future to include the installations of a 1 MW solar PV system and 750 kW micro-turbines.

In January 2007, the City Council joined hundreds of cities around the country and authorized the Mayor to sign the U.S. Mayors Climate Protection Agreement, known as the "Cool Cities" pledge. By entering into this agreement, the City has adopted the goal of reducing citywide emissions to 7% below 1990 levels by 2012. As detailed in the CAP, this goal was subsequently expanded in response to ARB's recommended reduction target of 15% below the 2005 baseline, and the City added a 2030 mitigation target to correlate with the 2030 General Plan Update and the goal of achieving an 80% reduction by 2050.

To help manage the City's energy use, water conservation, solid waste diversion and GHG reduction activities as well as the City's other natural resource conservation efforts, the City established the Natural Resource Conservation (NRC) Division in 2007.

In 2008, the City also became a partner with the San Joaquin Valley Clean Energy Organization (SJVCEO) to undertake a clean-energy initiative by implementing additional clean energy measures and projects. This partnership led to the development of the Valley Innovative Energy Watch (VIEW), which is a partnership with Southern California Edison (SCE), Southern California Gas Company (SoCalGas), Pacific Gas & Electric (PG&E), SJVCEO and other public jurisdictions in Kings/Tulare Counties. One major task in this initiative was assisting each of the local government partners to develop comprehensive clean energy/GHG reduction plans, including the identification of baseline emissions and energy use, which led to the current development of this Climate Action Plan by SEI.

The City Council initiated the 2030 General Plan Update process in early 2010, beginning with the opportunity for residents to share their ideas about their community's future. The General Plan update has been a collaborative effort between the City and its residents to create a vision and a blueprint for development through 2030. The CAP was developed in conjunction with the 2030 GPU, to ensure that Visalia is tracking GHG emissions and has a strategy for mitigating GHG emissions to the 2020 and 2030 mitigation targets. The 2030 GPU includes a variety of smart growth policies, which work to reduce vehicle miles traveled in Visalia, encourage more compact development, and result in improved air quality for Visalia residents.

In 2011, the City of Visalia conducted a series of comprehensive energy audits funded through the City's Energy Efficient Conservation Block Grant (EECBG) Program. The audits identified 73 energy

efficiency measures to be implemented at 19 City-owned public facilities, which will result in an estimated aggregate savings of 827,000 kilowatt hours/year (kWh). The City applied for and received approval for a $500,000 low-interest (1%) Energy Efficiency Loan from the California Energy Commission (CEC) to implement the energy efficiency measures.

In addition to the facility audits, the City utilized EECBG funding to complete approximately $1 million in retrofits of HVAC, lighting, and traffic signals. Combined, the retrofits will save over 1,455,000 kilowatt hours per year and reduce greenhouse gas emissions by over 380 metric tons of CO2 equivalent.

In 2013, the City of Visalia adopted the Visalia Solar Strategy, which provides the City with a comprehensive approach to identifying financially feasible photovoltaic solar energy opportunities at City facilities, the evaluation of funding mechanisms, and the potential to increase solar deployment in the community. Phase I of the strategy includes solar at five City-owned facilities for a combined capacity of approximately 900 kW, and the project should be under construction in 2014.

Many of the measures described above, along with other initiatives, are discussed in detail in Section 3.2.1.

2. VISALIA'S GREENHOUSE Gas EMISSIONS INVENTORY

The first step in developing this Climate Action Plan for the City of Visalia was to conduct a baseline inventory of GHG emissions. A baseline inventory is an audit of the activities within Visalia that release GHGs and a projection of how much these activities are likely to grow in the future. The City of Visalia inventory involves two components: a community-wide inventory (i.e., the full geographic area of Visalia's jurisdiction) and a separate inventory of municipal facilities and activities. The community-scale analysis provides a performance baseline against which we can demonstrate progress being made throughout the Visalia community. The municipal inventory allows the City to track its individual facilities and vehicles and to evaluate the effectiveness of its internal emissions reduction efforts at a detailed level. The municipal inventory is a subset of the community inventory.

A baseline year inventory is a crucial first step in effective climate protection. An inventory identifies where emissions are coming from (e.g., vehicles, streetlights, commercial electricity use, etc.). By identifying sources of emissions, the City is in a better position to target projects and programs to reduce emissions in the future. Moreover, a baseline inventory serves as a reference against which to measure GHG reductions. Finally, the inventory provides an opportunity to define the departments, staff and resources needed to track emissions and through this process to build capacity to manage GHG emissions over time.

Putting things into perspective:
How do our activities translate into GHG emissions?

1 kWh of electricity use = 0.6 pounds CO2e*
1 therm of natural gas use = 12 pounds CO2e
1 gallon of propane use = 13 pounds CO2e
1 gallon of gasoline use = 20 pounds CO2e
1 lb of solid waste generated = 0.9 pounds of CO2e

**Carbon dioxide equivalent*

2.1. Method

2.1.1. Overview

With assistance from City of Visalia staff, SEI conducted Visalia's GHG emissions inventory utilizing ICLEI's GHG emissions inventory software (Clean Air & Climate Protection software 2009 version 3) and the Local Government Operations Protocol (May 2010 version 1.1) developed by the California Air Resources Board (ARB), the California Climate Action Registry, and ICLEI.

2.1.2. Baseline Year

The first step in an inventory is to define the baseline year for which the inventory will be conducted. It is desirable to conduct an emissions inventory for the earliest year for which complete and accurate data can be gathered. However, the further back in time you go, the more challenging data collection becomes as data are lost or conditions change. For Visalia, the year 2005 was selected as the baseline year for both community and municipal activities based on the emissions reduction target recommended by the California Air Resources Board (ARB) in the Scoping Plan (December 2008)[22]. ARB recommends a voluntary GHG emissions reduction goal for California local governments of *15% below the baseline year of 2005 by 2020* to ensure that municipal and community-wide emissions are in line with the State's AB 32 reduction target. The City elected to expand the emissions reduction goal through 2030, and also established a target of *30% below the baseline year of 2005 by 2030.* The 2030 goal provides the opportunity to mitigate the GHG impacts associated with the 2030 General Plan Update, and provide a clear path towards the State's goal of an 80% emissions reduction by 2050[23].

2.1.3. Information Sources

Information utilized in this inventory was taken from a variety of sources, including Southern California Edison, Southern California Gas Company, the California Department of Transportation, Census Data, and internal City records. In cases where specific historical or forecast data were not available, estimates were made by extrapolating from existing data.

All sources of GHGs are reported in metric tons of "carbon dioxide equivalent" (CO2e) released into the atmosphere in a given year. Converting all emissions to CO2e allows for the consideration of different GHGs with different "potencies" in comparable terms. For example, methane is 21 times more powerful than CO2, so one metric ton of methane emissions is converted to 21 metric tons of CO2e for the inventory.

2.1.4. GHG Emissions Inventory Tools

To develop much of the GHG emissions inventory, SEI utilized ICLEI's Clean Air & Climate Protection (CACP) software (2009 version 3). ICLEI developed the Clean Air and Climate Protection (CACP) software package in partnership with the State and Territorial Air Pollution Program Administrators (STAPPA), the Association of Local Air Pollution Control Officials (ALAPCO), and Torrie Smith Associates. This software calculates emissions resulting from energy consumption and waste generation for numerous activities in the community-wide and municipal sectors (separately). Where appropriate, the emission factors within the CACP software were updated with emission factors from the latest Local Government Operations (LGO) Protocol (May 2010 version 1.1), a standardized GHG emissions inventory protocol for local government operations that was developed by ARB, the California Climate Action Registry, and ICLEI. Although the LGO Protocol is specific to municipal operations, the modified emission factors were also used for the community inventory in the CACP since emission factors should be consistent across all sectors. The U.S. Environmental Protection Agency's Waste Reduction Model (WARM) online software (February 2012 version) was also utilized specifically for calculating the emissions from solid waste

[22] California Air Resources Board. Climate Change Scoping Plan. December 2008. http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm
[23] Executive Order S-3-05 by the Governor of the State of California

operations for both the municipal and community inventories, as it utilizes the most up-to-date emission factors for solid waste activities.

2.1.5. Types of Greenhouse Gas Emissions Assessed

Emissions of all six internationally-recognized GHG regulated under the Kyoto Protocol were assessed:

- Carbon dioxide (CO2);
- Methane (CH4);
- Nitrous oxide (N2O);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Sulfur hexafluoride (SF6).

2.1.6. Greenhouse Gas Emissions Scopes

ICLEI categorizes **community emissions** sources in terms of where they occur in relationship to the geographic boundaries of a place and the timescale of an inventory. To separately account for direct and indirect emissions, to improve transparency, and to provide utility for different types of climate policies and goals, community emissions sources can be categorized into three different scopes, described below.

- *Scope 1*: Emissions that occur within the boundaries of a community.

- *Scope 2*: Emissions that occur outside of the community boundaries, but are a direct result of community activities.

- *Scope 3*: Emissions from up-stream processes or lifecycle/lifetime energy embodiment and process emissions

The LGO Protocol categorizes **municipal emissions** in terms of local government control rather than geographic boundaries. Specifically, only those emissions resulting from operations directly controlled/managed by the local governments are to be assessed.

- *Scope 1*: All direct GHG emissions (with the exception of direct CO2 emissions from biogenic/biomass sources[24]), including:

    - Stationary combustion (e.g., electricity, steam, heat or power in fixed location)
    - Mobile combustion (e.g., fleet transportation sources, off-road vehicle equipment)

[24] It is important to note that CO2e emissions from biomass combustion (e.g. wood, landfill/sewage gas, ethanol, etc.) are tracked separately because the carbon in biomass is of a biogenic origin – meaning that it was recently contained in living organic matter – while the carbon in fossil fuels has been trapped in geologic formations for millennia. Climate change is primarily the result of the release of these millennia-aged fossil fuels through human made activities. The carbon concerned in biomass combustion would have been emitted into the atmosphere through the natural decay process. For additional information, please refer to Chapter 4.5 in the LGO Protocol.

- Process emissions (e.g., manufacturing of cement, aluminum, etc.)
- Fugitive emissions (HFCs from refrigeration leaks, SF6 from electrical power distributors, and CH4 from solid waste landfills)

- *Scope 2*: Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling.

- *Scope 3 (Optional)*[25]: All other indirect emissions not covered in Scope 2, such as emissions resulting from up-stream processes or lifecycle/lifetime energy embodiment, process emissions from the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity (e.g., employee commuting and business travel), waste disposal, etc.

- *Information Items:* In addition to emissions, several information items are to be identified and reported in order to present a more complete picture of a local government's energy use patterns and impact on the climate. These include the following:

  - Biogenic CO2 from biomass combustion (e.g., landfill gas, biogas, wood, etc.)
  - Carbon offsets retired/generated and sold
  - Renewable energy certificates retired/generated and sold

  In the case of the City of Visalia, biogenic CO2 from biomass combustion (specifically from methane combustion at the City's Water Conservation Plant) is identified and reported in the inventory. However, due to the fact that they are of biogenic origin[26], the emissions are not included in the total municipal operations inventory emissions.

2.1.7. Limitations on Inventory

Visalia's municipal and community emissions inventories primarily contain emission sources falling within Scope 1 and Scope 2. For the municipal inventory, Scope 3 emissions, employee commute and solid waste emissions specifically, although optional were included.

While some of the information needed to conduct the 2005 baseline inventory was readily obtainable, some was not. Notable gaps include:

- A complete set of emissions data from propane use for the community. Propane use within the Visalia community from one major distributor (Windmill Propane) is included in the inventory.
- Emissions data from refrigerant leakage from air conditioning and refrigeration systems for the community sectors. Refrigerant emissions from the community sector, specifically for the built environment (e.g. refrigerant leaks from HVAC units, refrigerators, and fire suppression equipment) and motor vehicles were not included in the inventory due to the lack of reliable data and/or method. Refrigerant emissions estimates for the municipal

[25] Calculating emissions from Scope 3 is considered optional under the LGO Protocol. However, ICLEI recommends employee commute for inclusion, and therefore, it was included in the municipal operations inventory for Visalia. Additionally, although optional, the emissions from solid waste generation by municipal operations were also included in the municipal inventory.

[26] Ibid.

inventory were included in the inventory utilizing assumptions based on feedback from City staff.

- A complete set of emissions data for the agriculture sector in the community inventory. Although emissions from electricity use and propane use for the agriculture sector have been included in the community inventory (under commercial/industrial sector), additional emissions relating to agricultural activities have not been included (e.g. emissions from manure management and fertilizer use) due to the difficulty in collecting this information.

Although LGO Protocol and the CACP are sophisticated tools for conducting GHG emissions inventories, calculating emissions generated and potential reductions with precision is challenging. The model depends on the quality of available data and inevitably includes numerous estimates and assumptions. To the extent possible, SEI has attempted to accurately represent conditions in Visalia and to provide clear documentation where we have made estimates or assumptions (please see Appendix A.1 for assumptions). However, it is important to look at these results as an approximation of reality rather than an exact picture. As this first inventory is considered a starting place for climate change management in Visalia, ongoing efforts will be needed to both refine inputs and update them as conditions change. It is highly recommended that the City of Visalia complete a comprehensive inventory of emissions regularly (every 3-5 years) following the baseline year. As there may be changes that affect the City's and the community's emissions and/or availability of more accurate data[27], periodic recalculation of the inventory will increase its accuracy to better reflect the actual emissions of Visalia. Additionally, taking advantage of the emergence of new and more advanced inventory tools and the improvement of existing tools for regular inventory updates will help to continuously refine the accuracy of Visalia's inventory.

2.2 Greenhouse Gas Emissions Inventory Results

2.2.1. Community Emissions Inventory

Overview

The community inventory includes Scope 1, Scope 2, and Scope 3[28] sources from the following sectors:

- Residential
- Commercial / Industrial
- Transportation
- Solid Waste

[27] Of particular note is the community activities protocol, which was recently released by ICLEI while the CAP was being developed. This protocol provides guidance on identifying and quantifying emissions on the community-wide level. ICLEI has yet to update the CACP software with the community activities protocol.
[28] Please refer to Section 2.1.6 for descriptions of scopes.

Table 11: Scopes and Community Sectors Included in Visalia's Community Inventory for 2005

Community Sectors	Scope 1	Scope 2	Scope 3	Informational Item
Residential	Natural Gas, Propane	Electricity	-	-
Commercial / Industrial	Natural Gas, Propane, CH4 and N2O Emissions from wastewater treatment operations, Refrigerants*	Electricity	-	Halon*, Biogas combustion **
Transportation	Gasoline, Diesel, Compressed Natural Gas, Aviation Gasoline, Jet Fuel, Refrigerants*	-	-	-
Solid Waste	-	-	CH4 from Anaerobic Decomposition	-

** Emissions from municipal operations only; refrigerants = from HVAC/refrigeration systems in municipal facilities and vehicles; halon = municipal fire suppression equipment*
*** Due to the fact that they are of biogenic origin[29], the emissions from biogas are included in the inventory as an informational item only.*

The City of Visalia's community activities emitted approximately **906,337 metric tons of CO2e in 2005** (Table 12 and Figure 5). Emissions from the transportation sector were the most significant of all community sectors, comprising 55%, followed by the commercial/industrial sector (23%) and then closely by the residential sector (22%). The metric tons of the different types of GHGs that were released are also provided in Table 12. Among the scopes, emissions from Scope 1 made up the most significant percentage of emissions (75%) (Table 13 and Figure 6).

Table 12: Visalia's 2005 Community Emissions Summary by Sector

Community Sectors	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	HFC (metric tons) [1]	CO2e (metric tons)	% CO2e of All Sectors
Transportation	490,063	30.7	28.2	0.41	500,112	55%
Commercial / Industrial	208,342	19.8	6.1	0.001	210,634	23%
Residential	202,533	14.7	2.0	-	203,453	22%
Solid Waste [2]	-	-	-	-	-7,862 [3]	-1%
TOTAL	**900,938**	**65**	**36**	**0.41**	**906,337**	**100%**

[1] Emissions from municipal operations only
[2] For the solid waste sector, CO2 and CH4 emissions could not be separated because the EPA WARM software utilized to calculate the emissions only provides results in CO2e.
[3] The solid waste CO2e figure denotes a net GHG emissions figure resulting from landfilled solid waste, composting, and recycling activities in 2005. The negative figure is a result of the GHG emissions avoided specifically from composting and recycling efforts implemented by the City in 2005. Additional information is provided in the "Solid Waste" section of the community inventory discussions.

[29] Please refer to Section 2.1.6 for more information on biogenic emissions.

Figure 5: Visalia's 2005 Community Emissions Summary by Sector

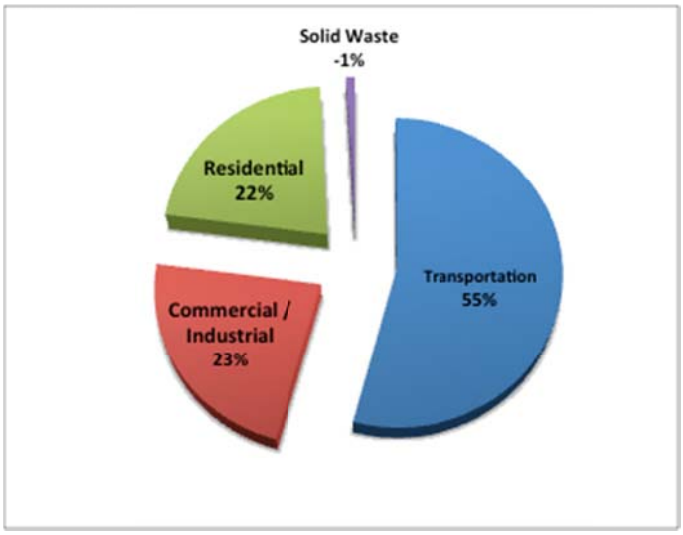
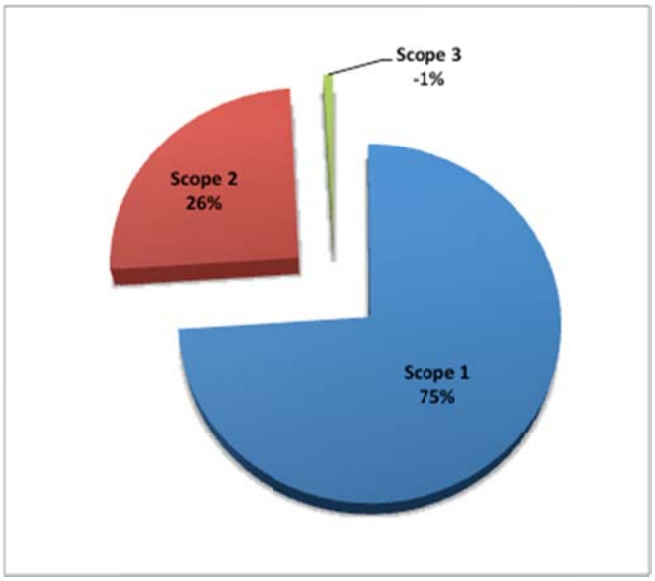


Table 13: Visalia 2005 Community GHG Emissions by Scope (Metric Tons CO2e)

Community Sectors	Scope 1	Scope 2	Scope 3	Total	% CO2e of All Sectors
Transportation	500,112	-	-	500,112	55%
Commercial / Industrial	79,874	130,760	-	210,634	23%
Residential	101,627	101,826	-	203,453	22%
Solid Waste	-	-	-7,862	-7,862	-1%
TOTAL	**681,613**	**232,586**	**-7,862**	**906,337**	**100%**
Percentage of Total CO2e	**75%**	**26%**	**-1%**	**100%**	

Figure 6: Visalia 2005 Community GHG Emissions by Scope (Metric Tons CO2e)



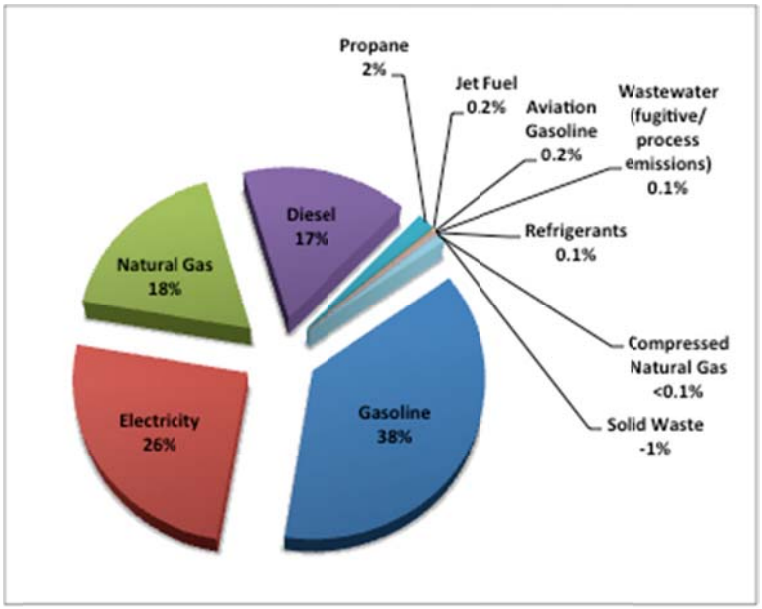
In addition to viewing emissions by sector and by scope, it can be useful to analyze emissions according to their raw fuel or waste source. Table 14 and 7 below provide the percentage breakdown of the actual sources of the emissions. Emissions from gasoline, electricity, natural gas, and diesel use make up 99% of all emissions sources in Visalia.

Table 14: Visalia 2005 Community GHG Emissions by Source

Source Category	CO2e (metric tons)	% CO2e of All Source Categories
Gasoline	346,347	38%
Electricity	232,586	26%
Natural Gas	165,013	18%
Diesel	149,791	17%
Propane	15,242	2%
Jet Fuel	1,704	0.2%
Aviation Gasoline	1,509	0.2%
Wastewater (fugitive/process emissions)	1,246	0.1%
Refrigerants*	664	0.1%
Compressed Natural Gas	97	0.01%
Solid Waste	-7,862	-1%
TOTAL	**906,337**	**100%**

* *Emissions from municipal operations only*

Figure 7: Visalia 2005 Community GHG Emissions by Source



The Built Environment (Residential, Commercial, Industrial)

Emissions from the built environment represent GHGs emitted from the residential, commercial, and industrial sectors of Visalia's community. Emission sources here specifically include electricity use (including electricity use for water/wastewater operations), natural gas use, propane use, refrigerants (only from municipal operations), and fugitive/process emissions from wastewater treatment. Emissions from commercial and industrial sectors were combined due to the 15/15 Rule released by California Public Utility Commission.[30] Electricity use and natural gas use include Southern California Edison and Southern California Gas Company as well as Direct Access services.

Emissions from the built environment are divided almost equally by the residential and the commercial/industrial sectors (Table 15). Emissions from electricity use (62%) made up the largest source of commercial/industrial emissions, followed by natural gas use (33%) (Table 16). Within the residential sector, electricity and natural gas made up the bulk of the emissions (combined total of 97%) (Table 17).

[30] The 15/15 rule requires that any aggregated information provided by the Utilities must be made up of at least 15 customers and a single customer's load must be less than 15% of an assigned category. If the number of customers in the complied data is below 15, or if a single customer's load is more than 15% of the total data, categories must be combined before the information is released. Source: Southern California Edison http://www.sce.com/NR/sc3/tm2/pdf/CE274.pdf

Table 15: Visalia's 2005 Emissions from the Built Environment

Sector	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	HFC (metric tons)*	CO2e (metric tons)	% CO2e of All Built Envt Emissions
Commercial / Industrial	208,342	19.8	6.1	0.001	210,634	**51%**
Residential	202,533	14.7	2.0	-	203,453	**49%**
TOTAL	**410,875**	**34**	**8**	**0.001**	**414,087**	**100%**

**Emissions from municipal operations only*

Table 16: Visalia's Commercial/Industrial GHG Emissions Sources

Source	CO2e (metric tons)	Percentage
Electricity	130,760	62%
Natural gas	70,245	33%
Propane	8,383	4%
Wastewater (fugitive/process emissions)	1,246	1%
Refrigerants*	1.4	0.001%
TOTAL	**210,634**	**100%**

** Emissions from municipal operations only*

Table 17: Visalia's Residential GHG Emissions Sources

Source	CO2e (metric tons)	Percentage
Electricity	101,826	50%
Natural gas	94,768	47%
Propane	6,859	3%
TOTAL	**203,453**	**100%**

The inventory for propane use is very limited because, unlike natural gas, propane sales are decentralized, and not all the companies selling propane in Visalia had or provided records for 2005. Propane use from one major distributor in Visalia (Windmill Propane) is included in the inventory.

Emissions associated with water/wastewater treatment operations (from City operations) are included in the commercial/industrial sector, including fugitive and process emissions and other direct and indirect sources of emissions from wastewater treatment operations. For detailed information on the emissions from the water/wastewater treatment operations, please refer to the "Water/Wastewater Treatment Operation" section in the municipal inventory discussion of the CAP.

Emissions from refrigerants from Visalia's municipal facilities (only)[31] were also included in the commercial/industrial sector of the community inventory, since the municipal inventory is a subset

[31] Refrigerant emissions from buildings (e.g. HVAC and refrigeration systems) were not included in the community inventory due to the lack of reliable and accurate information.

of the community inventory. For additional information on emissions from municipal refrigerants, please see "Municipal Buildings/Facilities" section in the municipal inventory discussion of the CAP.

Transportation

Emissions from the Visalia transportation sector include those GHGs emitted from on-road vehicles (local roads and state highways[32]), off-road vehicles, and air travel from the Visalia Municipal Airport. Emissions from fossil fuel combustion from on-road vehicles on local roads made up the largest contributor of GHGs for Visalia in 2005 (52%) (Table).

As shown in Table 18, off-road vehicles include a variety of classes of vehicles. The types of equipment under each class are available in Appendix A.2. Emissions from agriculture equipment made up the largest portion of emissions from off-road emissions at 73%, followed by construction and mining equipment at 15%.

Another source of emissions from the transportation sector is refrigerants that consist of HFCs. Refrigerants are used in motor vehicles with refrigeration systems like air conditioning units. Although emissions from motor vehicle refrigerants in the community sector were not included in the inventory due to the lack of reliable and accurate data, emissions from Visalia's vehicle and transit fleet were included in the transportation sector of the community inventory (Table 18). For additional information on emissions from municipal fleet refrigerants, please see "City Vehicle and Transit Fleet" section in the municipal inventory.

Table 18: Emissions from Visalia's 2005 Transportation Sector – Fossil Fuel Source

Transportation Class	Annual Vehicle Miles Traveled (miles)	Fuel Type	Gallons / Gallons of Gasoline Equivalent (for CNG only)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	CO2e (metric tons)	% CO2e of All Trans. Emissions
On-Road Vehicles: Local Roads	429,572,150	Gasoline	-	211,797	13	16	216,942	52%
		Diesel	-	41,727	0.12	0.12	41,767	
		CNG	21,190	91	0.13	0.01	96	
On-Road Vehicles: State Highway	242,577,539	Gasoline	-	119,663	7	9	122,570	29%
		Diesel	-	23,563	0.07	0.07	23,585	
Off-Road Vehicles	-	Gasoline	771,246	6,771.54	0.56	0.17	6,836	18%
	-	Diesel	8,184,861	83,567.43	10	2	84,439	
	-	CNG	200,259	1.45	-	-	1.45	
Visalia Municipal Aircrafts	-	Aviation Gasoline	143,784	1,195	0.016	1.012	1,509	1%
	-	Jet Fuel	176,380	1,688	0.055	0.048	1,704	
TOTAL				**490,064**	**30.7**	**28.2**	**499,450**	**100%**

[32] VMT for state highways 63, 198, and 216 were included in the analysis based on the fact that they pass directly through Visalia's jurisdiction.

Table 19: Visalia's 2005 Off-Road Transportation Emissions

Class	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	CO2e (metric tons)	% CO2e of All Off-Road Trans. Emissions
Agricultural Equipment	65,628.44	9.26	1.67	66,340	73%
Construction and Mining Equipment	13,130.11	0.75	0.33	13,249	15%
Transport Refrigeration Units	3,415.12	0.19	0.09	3,446	4%
Light Commercial Equipment	2,824.72	0.16	0.07	2,850	3%
Industrial Equipment	2,442.79	0.14	0.06	2,464	3%
Lawn and Garden Equipment	1,797.50	0.10	0.05	1,813	2%
Recreational & Entertainment Equipment	1,101.27	0.06	0.03	1,111	1%
Airport Ground Support Equipment	0.47	0.00	0.00	0.5	0.001%
TOTAL	**90,340**	**10.7**	**2.3**	**91,277**	**100%**

Table 20: Fugitive Emissions from Municipal Vehicle & Transit Fleet - Refrigerants

HFC (metric tons)	CO2e (metric tons)
0.41	663

It is important to understand that the fuel purchased and used by potentially non-Visalia residents could not be separated from the total fuel sold by the Airport, and therefore, in effect, the estimates provided may be an overestimate of the actual emissions from Visalia residents' air travel. However, because of the relatively small size of the Visalia Municipal Airport and the fact that it mainly serves local residents, this overestimation of emissions should be minimal.

Solid Waste

In 2005, the City's Solid Waste Division collected a total of 177,782 tons of solid waste. A majority (74%) of the collected waste was sent to landfills (Visalia landfill and the Woodville landfill accepted about 91% of Visalia's landfill waste in 2005)[33]. Approximately 17% and 8% of the

[33] It should be noted that a significant portion of solid waste generated by the community was diverted from the landfill before reaching the solid-waste collection system, and as such, is difficult to quantify. Using the California Department of Resources Recycling and Recovery methodology, the estimated 2005 diversion rate was 54%.

remaining solid wastes were composted and recycled, respectively. A net CO2e MT reduction is reported for the community's solid waste sector based on the GHG emissions reduction benefits of recycling and composting.[34]

Table 21: Emissions from Visalia's Community Waste Decomposition

Solid Waste Disposal	Tonnage (tons)	CO2e (metric tons)	Tonnage %
Landfill	131,867	40,427	74%
Compost (Yard / Green Waste)	30,886	-6,191	17%
Recycle	15,029	-42,098	8%
TOTAL	**177,782**	**-7,862**	**100%**

2.2.2. Municipal Operations Emissions Inventory

Overview

The framework of scopes discussed in the community emissions inventory equally applies to the municipal operations emissions inventory. The sources of emissions that are being counted in Scope 1 and 2 of the municipal inventory are facilities and equipment owned and operated by the City. Scope 3 emissions of the municipal operations inventory (considered optional under the LGO Protocol) are generally all indirect emissions not covered in Scope 2, such as lifecycle emissions sources (e.g., decomposition of waste) and emissions sources that the City does not own/operate, but may exhibit significant influence over (e.g., employee commute patterns, etc.). The municipal inventory includes Scope 1, Scope 2, and Scope 3 (optional) sources from the following sectors:

- Water/Wastewater facilities and operations
- Vehicle fleet
- Transit fleet
- Buildings and other facilities
- Employee commute
- Streetlights and traffic signals
- Airport facilities
- Solid waste

[34] For the solid waste portions of both the municipal and community inventories, the U.S. EPA WARM online model was utilized. The WARM tool is based on a life-cycle approach, which reflects emissions and avoided emissions upstream and downstream from the point of use. For recycling, in the WARM model, when a material is recycled, it is used in place of virgin inputs in the manufacturing process, rather than being disposed of and managed as waste. Consequently, recycling provides GHG reduction benefits in two ways: 1) it offsets a portion of "upstream" GHGs emitted in raw material acquisition, manufacture and transport of virgin inputs and materials, and 2) it increases the amount of carbon stored in forests (when wood and paper products are recycled). For composting, the EPA estimates that centralized composting of organics results in net carbon storage based on the assumption that carbon from compost remains stored in the soil. Source: http://epa.gov/epawaste/conserve/tools/warm/SWMGHGreport.html

Table 22: Scopes & Local Government Sectors Included in Visalia's 2005 Municipal Inventory

Local Government Sectors	Scope 1	Scope 2	Scope 3	Informational Item
Water/Wastewater	Natural Gas, CH4 and N2O from Wastewater Treatment Operations	Electricity	-	Biogas combustion*
Vehicle Fleet	Gasoline, Diesel, Compressed Natural Gas, Refrigerant	-	-	-
Transit Fleet	Gasoline, Diesel, Compressed Natural Gas, Refrigerant	-	-	-
Buildings/Facilities	Natural Gas, Refrigerant, Fire Suppression Equipment	Electricity	-	Halon
Employee Commute	-	-	Gasoline, Diesel	-
Streetlights & Traffic Signals	-	Electricity	-	-
Airport Facilities	-	Electricity	-	-
Solid Waste	-	-	CH4 from Anaerobic Decomposition	-

* *Due to the fact that they are of biogenic origin[35], the emissions from biogas are included in the inventory as an informational item only.*

Including all three scopes, City of Visalia's municipal operations emitted approximately **16,446 metric tons of CO2e in 2005** (Table 23 and 8). Municipal emissions constitute about 2% of Visalia's total community GHG emissions, which is typical across local governments. As a minor contributor to total emissions, actions to reduce municipal energy use and waste will have a limited impact on Visalia's community's overall emissions levels. However, municipal action has powerful symbolic value that extends beyond the magnitude of emissions actually reduced and those measures often reduce operating costs for the City.

As shown in Table 24, emissions from water/wastewater operations represent the largest contributor of GHG followed by transit fleet and vehicle fleet. Combined, emissions from these three sectors equate to 74% of all municipal emissions in 2005.

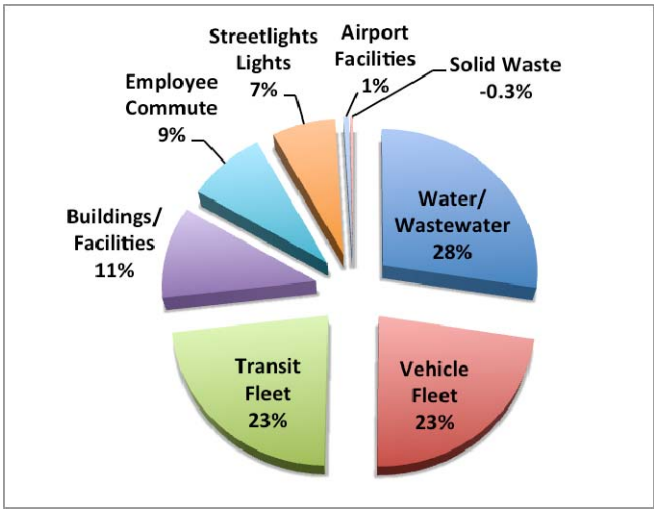
[35] Please refer to Section 2.1.6 for more information on biogenic/biomass combustion.

Table 23: Summary of Visalia's 2005 Municipal Emissions by Sector

Local Government Sectors	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	HFC (metric tons)	CO2e (metric tons)	% CO2e of All Municipal Emissions
Water/Wastewater	3,295	6.06	3.65	-	4,554	28%
Transit Fleet	3,667	0.21	0.04	0.065	3,793	23%
Vehicle Fleet	3,548	0.19	0.17	0.092	3,761	23%
Buildings/Facilities	1,718	0.094	0.024	0.001	1,727	11%
Employee Commute	1,385	0.08	0.10	-	1,416	9%
Streetlights & Traffic Signals	1,143	0.05	0.02	-	1,150	7%
Airport Facilities	100	0.005	0.002	-	101	0.6%
Solid Waste [1]	-	-	-	-	-56 [2]	0%
TOTAL	**14,856**	**6.69**	**3.99**	**0.16**	**16,446**	**100%**

[1] For the solid waste sector, CO2 and CH4 emissions could not be separated because the EPA WARM software only provides results in CO2e.
[2] The solid waste CO2e figure denotes a net GHG emissions figure resulting from landfilled solid waste, composting, and recycling activities in 2005. The negative figure is a result of the GHG emissions avoided specifically from composting and recycling efforts implemented by the City in 2005. Additional information is provided in the "Solid Waste" section of the municipal inventory discussions.

Figure 8: Summary of Visalia's 2005 Municipal Emissions by Sector

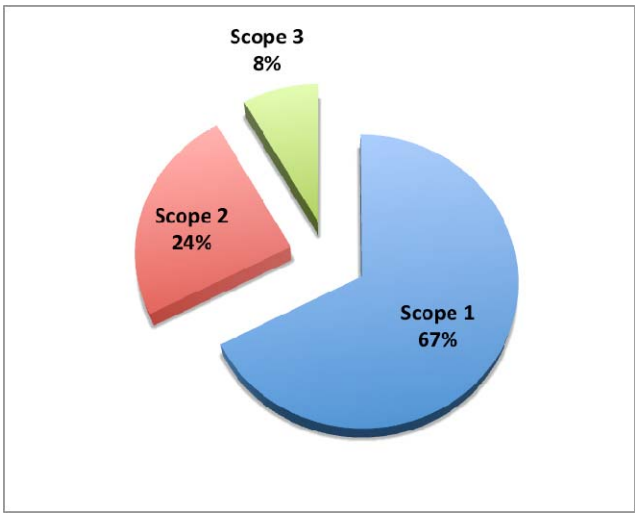


Scope 1 emissions constitute the highest concentration of municipal operations (67%), followed by Scope 2 (24%) and finally Scope 3 (8%) (Table 24 and Figure 9). Within Scope 1, emissions from transit fleet were the largest contributor of GHG. Emissions from water/wastewater operations constituted the biggest percentage of Scope 2 emissions. In Scope 3, employee commute was the largest emitter of GHG.

Table 24: Summary of Visalia's 2005 Municipal Emissions by Scope

Local Government Operations	Scope 1	Scope 2	Scope 3	TOTAL
Water/Wastewater	3,173	1,381	-	**4,554**
Transit Fleet	3,793	-	-	**3,793**
Vehicle Fleet	3,761	-	-	**3,761**
Buildings/Facilities	359	1,368	-	**1,727**
Streetlights Lights	-	1,150	-	**1,150**
Employee Commute	-	-	1,416	**1,416**
Airport Facilities	6	95	-	**101**
Solid Waste	-	-	-56	**-56**
TOTAL	**11,092**	**3,994**	**1,360**	**16,446**
% of Total CO2e	**67%**	**24%**	**8%**	**100%**

Figure 9: Summary of Visalia's 2005 Municipal Emissions by Scope



Municipal Buildings/Facilities

Buildings/facilities are generally large users of energy, specifically, electricity and natural gas. Table 25 displays 2005 emissions from energy use for Visalia's municipal buildings/ facilities/ departments. Based on the inventory, the Convention Center was the largest emitter of all City facilities (comprising about 34% of the total emissions). The breakdown of all city municipal electricity and natural gas use and their associated emissions, including individual municipal building/facilities/department, are provided in Appendix A.3. These buildings/facilities also likely contain refrigeration systems, which may contain or consist of HFC compounds, another form of GHG. A complete breakdown of emissions from municipal facilities is provided in Table 25.

Table 25: Emissions from Municipal Facilities/Buildings/Departments [1]

Municipal Bldg/Facility/ Department	Electricity Use (kWh)	Natural Gas Use (Therms)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	Total Emissions (metric tons)	Total Cost ($)	% CO2e of All Blgs/ Facilities
Convention Center	1,192,754	20,079	467	0.026	0.006	469	$192,728	27%
Parks & Recreation	1,073,146	11,277	384	0.02	0.005	386	$182,071	22%
City Hall [2]	982,746	5,892	328	0.016	0.005	330	$141,163	19%
Miscellaneous	337,283	12,711	169	0.010	0.002	171	$90,449	10%
Police Dept / Fire Dept [3]	521,749	387	160	0.007	0.003	161	$65,200	9%
Public Works Dept	291,235	13,956	162	0.011	0.002	163	$54,104	9%
Fire Dept	106,502	2,366	45	0.003	0.001	45	$17,394	3%
Police Dept	432	0	0.13	0.000006	0.000002	0.13	$245	0.01%
TOTAL	**4,505,847**	**66,668**	**1,715**	**0.094**	**0.024**	**1,726**	**$743,355**	**100%**

[1] This table does not include energy use and associated GHG emissions from Visalia's Airport, water/wastewater operations (this includes WCP operations, pumping, irrigation), streetlighting, and traffic control. These categories are provided separately in the municipal sections below.
[2] "City Hall" represents City Hall East, City Hall West, and City Hall North.
[3] "Police Dept/Fire Dept" represents Police - HQ/ Fire Station #1 on 315 S Johnson Street and a facility on Johnson/Willow.

HFCs may also be emitted from fire suppression equipment, including hand-held fire extinguishers and total flooding applications that are in various buildings and facilities throughout the Visalia community. As fire equipment is tested or deployed, emissions of HFCs are released. In 2005, Halon 1301, a chlorofluorcarbon (CFC) based gas, was utilized in all of the City's fire suppression equipment. Due to the fact that Halon 1301 is technically not categorized as one of the reportable GHGs under the LGO Protocol standards, GHG emissions from Visalia's municipal fire suppression equipment has not been included in this inventory.

Streetlights and Traffic Signals

This category sector includes all traffic signals, pedestrian signals, sidewalk and outdoor street lighting. Streetlights make up the majority (about 86%) of all emissions from streetlight and traffic signals while emissions from traffic and pedestrian signals account for the remaining emissions (14%). Across all municipal emissions, streetlights and traffic signals generate approximately 7% of total emissions (Figure 8).

Table 26: Emissions from Streetlights and Traffic Signals

Lighting Type	Electricity Use (MWh)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	CO2e (metric tons)	Cost ($)	% CO2e of All Street/Traffic Lights
Streetlights	3,240	978	0.0440	0.0160	984	$618,953	86%
Traffic & Pedestrian Signals	547	165	0.0070	0.0030	166	$63,802	14%
TOTAL	**3,787**	**1,143**	**0.0510**	**0.0190**	**1,150**	**$682,755**	**100%**

Water/Wastewater Operations

This sector category includes water/wastewater treatment operations (e.g. wastewater treatment, pumping, irrigation, agriculture operations) for the City of Visalia. The City government owns and operates its own Water Conservation Plant (WCP). Emissions associated with water/wastewater treatment operations include the following three sources:

- *Source 1*: Electricity use to power operations within the WCP as well as for pumping activities.[36] A significant portion of this energy is utilized to treat wastewater at the WCP.
- *Source 2*: CH4 and N2O (fugitive and process emissions) from wastewater treatment process at the WCP. Specifically, CH4 from incomplete combustion of wastewater treatment digester gas (biogas) and N2O from effluent discharge and treatment process without a nitrification/denitrification system.[37]
- *Source: 3*: Biogenic emissions from flaring/combustion of biogas at the WCP (informational item only).

2005 emissions from all water/wastewater treatment activities and operations (includes electricity use, natural gas use and fugitive/process emissions) are summarized in Table 27. This includes emissions from Scopes 1 and 2 discussed above.

Table 27: Emissions from All Water/Wastewater Treatment Operations and Activities (Emissions from Energy Use and Fugitive/Process Emissions)

Electricity Use (kWh)	Natural Gas Use (Therms)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	CO2e (metric tons)	Cost ($)
4,545,577	362,571	3,295	6.06	3.65	4,554	$879,168

Source 3, the biogenic emissions from biomass combustion (e.g., landfill gas, biosolids, wood, etc.), were also collected for the City's WCP. As stated in Section 2.1.6, biogenic emissions under the LGO Protocol are considered an *Information Item* and therefore identified separately from all other municipal emissions. In 2005, the WCP produced and combusted almost 50,000,000 cubic feet of biogas generated from its operations through two processes: 1) combustion by an internal combustion engine to power a blower that supplies air for the facility's aeration basins and 2) flaring of wastewater treatment biogas. Only the amount of biogas produced and combusted at the WCP in 2005 are reported in the table below. The CO2e resulting from combustion could not be quantified due to a lack of a reliable emission factor for wastewater treatment biogas combustion.[38]

[36] Because SCE does not distinguish clearly between electricity use from agriculture operations, water pumping and wastewater pumping, the electricity use for these three categories have been combined.
[37] Source: Local Government Operation Protocol, 2010 version 1.1.
[38] The LGO Protocol 2010 version 1.1 does not provide emission factors for wastewater treatment biogas.

Table 28: Biogenic Combustion from City's WCP (Information Item Only)

WCP Process	Biogas Production and Combusted (cubic ft)
Internal Combustion Engine	44,333,703
Flaring	4,925,967
TOTAL	**49,259,670**

City Vehicle and Transit Fleet

In 2005, the City had approximately 350 vehicles in its vehicle fleet (includes about seven airport vehicles) and 40 in its transit fleet. These include passenger vehicles, light trucks, SUVs, vans, solid waste trucks, trolleys, buses, motorcycles, police patrol vehicles, fire engines, street sweepers, tractors, forklifts, cranes, and other construction vehicles. Depending on the vehicle, different types of fossil fuels – gasoline, diesel, and compressed natural gas (CNG) – were used to operate these vehicles.

As shown in Table 23, emissions from the City's transit fleet and vehicle fleet were the second and third largest contributors of municipal emissions, each representing approximately 23% of all municipal emissions in 2005. Together, vehicle and transit fleet made up 46% of all municipal emissions in 2005.

Similar to buildings and facilities, refrigerants are used in motor vehicles with refrigeration systems like air conditioning units. These emissions have been included in the inventory analysis. Emissions from vehicle and transit fleet by City Department are shown in Table 29 below. The largest percentage of fleet emissions comes from gasoline and diesel consumption from transit fleet (50%), followed by emissions from the Public Works Department (29%). Combined, these two departments alone generate over 79% of all emissions from municipal vehicle and transit fleet.

Table 29: Emissions from Municipal Fleet (Vehicle and Transit)

Function	Gasoline Use (gallons)	Diesel Use (gallons)	CNG (gallons of gasoline equivalent)	Fuel Cost ($)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	HFC (metric tons)	CO2e (metric tons)	% of Total Fleet GHG Emissions
Transit Fleet	11,120	671,976	21,190	$2,120,210	3,667	0.211	0.035	0.065	3,793	50%
Public Works Dept	139,838	94,928	-	$469,381	2,150	0.128	0.091	0.027	2,216	29%
Police Dept	104,936	-	-	$319,052	921	0.038	0.053	0.043	995	13%
Parks & Recreation Dept	18,297	4,545	213	$69,920	208	0.010	0.012	0.011	227	3%
Fire Dept	2,314	10,817	-	$38,058	131	0.001	0.001	0.005	137	2%
Airport	8,858	-	-	$23,827	78	0.004	0.006	0.001	82	1%
Community Development Dept	6,598	-	-	$20,059	58	0.004	0.005	0.004	66	1%
Admin Dept	4,018	-	-	$769	0.04	0.001	0.001	0.000	36	0.5%
Convention Center	210	-	-	$638	2	0.000	0.000	0.001	3	0.04%
TOTAL	**296,187**	**782,265**	**21,403**	**$3,061,914**	**7,215**	**0.397**	**0.204**	**0.157**	**7,554**	**100%**

Visalia Municipal Airport Facility

Visalia's Municipal Airport offers airline and charter services, aircraft maintenance, and flight instructions at its facilities. In 2005, Visalia's Airport facilities contributed less than 1% of all municipal operations, which equates to approximately 100 metric tons of CO2e from energy use.[39]

Table 30: Emissions from Airport Facility

Electricity Use (kWh)	Natural Gas Use (Therms)	Cost ($)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	CO2e (metric tons)
312,039	1,160	$47,223	100	0.0050	0.0020	101

Employee Commute

Emissions from employee commute are considered Scope 3 because it is not a source that the City has direct control over, as is the case for municipal vehicles and buildings/facilities. Nonetheless, local governments all over the country have developed effective programs for reducing emissions from commute patterns of their employees, and therefore, employee commute emissions are included as an area where cities can make progress.

To collect data for the employee commute emissions analysis, the City issued an online survey to all current employees with SEI's support (see Appendix A.4. for survey). A total of 178 employees completed the survey, of which 125 were employed by the City in 2005 (there were a total of approximately 646 full-time equivalent employees in 2005). This represents a 19% response rate for the year 2005. The information collected from the 125 employees was used to extrapolate total emissions for all employees in 2005. Results are displayed in Table 31 below. Emissions from passenger vehicles represent the largest source of emissions for employee commute in 2005 followed closely by light-duty trucks (SUVs, pick-up, light trucks).

Table 31: Emissions from Employee Commute

Commute Mode	Gasoline Use (gallons)	Diesel Use (gallons)	Cost ($)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	CO2e (metric tons)
Passenger Vehicle	80,185	0	$201,825	704	0.04	0.04	718
Light-duty vehicle (SUV, pick-up, light truck)	66,990	8,240	$195,393	672	0.04	0.05	689
Motorcycle	962	0	$2,422	8	-	-	8
Heavy-duty vehicle (public transit)	0	25	$0	0.3	0.00	0.00	0.3
TOTAL	**148,137**	**8,265**	**$399,640**	**1,385**	**0.077**	**0.095**	**1,416**

[39] Emissions from aircraft (e.g. jet fuel and aviation gasoline combustion) are reported in the community inventory.

Solid Waste

Emissions from solid waste decomposition is considered Scope 3 under the municipal inventory due to the fact that the City government does not own or operate the facilities (e.g., landfills, recycling and composting facilities) where Visalia's solid waste is sent. However, the City government does have the authority to help cut down the emissions from solid waste indirectly by promoting and instituting policies for the reduction of solid waste generation within its facilities.

In 2005, compost made up the largest share of solid waste that was generated by municipal operations, followed by solid waste that was sent to the landfills. A net CO2e MT reduction is reported for the municipal solid waste sector based on the GHG emissions reduction benefits of recycling and composting.[40]

Table 32: Emissions from Municipal Solid Waste in 2005

Solid Waste Disposal	Tonnage (tons)	CO2e (metric tons)	Cost ($)	Tonnage %
Landfill	105	32	$3,261	31%
Recycle	16	-45	$374	5%
Compost (Plant/Green Waste)	216	-43	$4,324	64%
TOTAL	**338**	**-56**	**$7,960**	**100%**

2.2.3. Emissions Projections

Based on the 2005 baseline year emissions inventory, the next step was to forecast future emissions generated by Visalia. The forecast is essential for setting the reduction target, since the amount of GHG emissions Visalia will ultimately pledge to reduce will be based on projected emissions. However, it is also important to emphasize that forecasts are subject to change with changing times. Therefore, it is important for the City to continue to update the forecast when conducting inventory updates in the future.

The target year 2020 was selected to correlate with the reduction target year that is recommended for Visalia (this is discussed in more detail in Section 3.1 below). The GHG emission forecast was also projected for the 2030 reduction target year.

The emissions forecast for both Visalia's community and municipal sectors consists of two scenarios: 1) business-as-usual (BAU) projection, which assumes no implementation of additional emissions reduction measures and 2) emissions projection that takes into account some of the State of California's most impactful emissions reduction initiatives. Specifically, these include the following:

[40] For the solid waste portions of both the municipal and community inventories, the U.S. EPA WARM online model was utilized. The WARM tool is based on a life-cycle approach, which reflects emissions and avoided emissions upstream and downstream from the point of use. For recycling, in the WARM model, when a material is recycled, it is used in place of virgin inputs in the manufacturing process, rather than being disposed of and managed as waste. Consequently, recycling provides GHG reduction benefits in two ways: 1) it offsets a portion of "upstream" GHGs emitted in raw material acquisition, manufacture and transport of virgin inputs and materials, and 2) it increases the amount of carbon stored in forests (when wood and paper products are recycled). For composting, the EPA estimates that centralized composting of organics results in net carbon storage based on the assumption that carbon from compost remains stored in the soil. Source: http://epa.gov/epawaste/conserve/tools/warm/SWMGHGreport.html

- Renewable Portfolio Standard (33% by 2020)
- AB 1493 (Pavley)
- Low Carbon Fuel Standard
- Energy Efficiency
- Electric Vehicle promotion

It is important to emphasize that this is not an exhaustive list of state measures. However, based on ARB's Climate Change Scoping Plan, these measures do make up a significant portion of projected state emissions reductions in 2020 and 2030. For additional information on these state initiatives, please refer to Appendix B.

By 2020, Visalia's **community** emissions are projected to increase from 2005 levels by **34%** under the BAU scenario and by **1%** under the Select State Measures scenario (Table 33). By 2020, Visalia's **municipal operations** emissions are projected to increase from 2005 levels by **68%** under the BAU scenario and by **31%** under Select State Measures scenario (Table 35). By 2030, Visalia's community emissions are projected to increase by 54% under the BAU scenario and -11% under the Select State Measures scenario from 2005 levels (Table 34). In 2030, Visalia's municipal emissions are projected to increase by 84% under the BAU scenario and 25% under the Select State Measures scenario from 2005 levels (Table 36). For details on the method taken to calculate the emissions projections, please see Appendix C.

Table 33: 2020 Emissions Projections for Visalia's Community Sector

Sector	Baseline Year	Business-As-Usual Emissions Projections				Emissions Projections with Select State Measures			
	2005 Emissions (MT CO2e)	2020 Emissions (MT CO2e)	CO2e Change from 2005 (MT CO2e)	Annual Growth Rate	% Change from 2005 to 2020	2020 Emissions (MT CO2e)	State Initiative Reductions (MT CO2e)	Annual Growth Rate	% Change from 2005 to 2020
Residential	203,453	299,002	95,549	2.60%	47%	230,851	68,152	0.85%	13%
Commercial / Industrial	210,634	279,153	68,519	1.90%	33%	196,208	82,945	-0.47%	-7%
Transportation	500,112	646,255	146,143	1.72%	29%	496,840	149,415	-0.04%	-1%
Solid Waste	-7,862	-10,973	-3,111	2.25%	40%	-10,973	0	2.25%	40%
TOTAL	**906,337**	**1,213,437**	**307,100**	**-**	**34%**	**912,926**	**300,511**	**-**	**1%**

Table 34: Emissions Projections for Visalia's Community Sector through 2030

Sector	Baseline Year	Business-As-Usual Emissions Projections				Emissions Projections with Select State Measures			
	2005 Emissions (MT CO2e)	2030 Emissions (MT CO2e)	CO2e Change from 2005 (MT CO2e)	Annual Growth Rate	% Change from 2005 to 2030	2030 Emissions (MT CO2e)	State Initiative Reductions (MT CO2e)	Annual Growth Rate	% Change from 2005 to 2030
Residential	203,453	386,499	183,046	2.60%	90%	264,374	122,125	1.05%	30%
Commercial / Industrial	210,634	324,732	114,098	1.75%	54%	194,494	130,238	-0.32%	-8%
Transportation	500,112	696,551	196,439	1.33%	39%	357,890	338,661	-1.33%	-28%
Solid Waste	-7,862	-13,458	-5,596	2.17%	71%	-13,458	0	2.17%	71%
TOTAL	**906,337**	**1,394,323**	**487,986**	**-**	**54%**	**803,300**	**591,024**	**-**	**-11%**

Table 35: 2020 Emissions Projections for Visalia's Municipal Sector

Sector	Baseline Year	Business-As-Usual Emissions Projections				Emissions Projections with Select State Measures			
	2005 Emissions (MT CO2e)	2020 Emissions (MT CO2e)	CO2e Change from 2005 (MT CO2e)	Annual Growth Rate	% Change from 2005 to 2020	2020 Emissions (MT CO2e)	State Initiative Reductions (MT CO2e)	Annual Growth Rate	% Change from 2005 to 2020
Buildings / Facilities	1,727	2,252	525	1.79%	30%	1,553	699	-0.71%	-10%
Streetlights & Traffic Lights	1,150	1,605	455	2.25%	40%	1,016	589	-0.82%	-12%
Water / Wastewater	4,554	12,578	8,024	7.01%	176%	9,331	3,246	4.90%	105%
Vehicle Fleet	3,761	4,559	798	1.29%	21%	3,876	684	0.20%	3%
Transit Fleet	3,793	4,901	1,108	1.72%	29%	4,496	406	1.14%	19%
Airport Facilities	101	141	40	2.25%	40%	92	49	-0.66%	-9%
Employee Commute	1,416	1,610	194	0.86%	14%	1,180	430	-1.21%	-17%
Solid Waste	-56	-64	-8	0.86%	14%	-64	0	0.86%	14%
TOTAL	**16,446**	**27,583**	**11,137**	**-**	**68%**	**21,479**	**6,103**	**-**	**31%**

Table 36: 2030 Emissions Projections for Visalia's Municipal Sector through

Sector	Baseline Year	Business-As-Usual Emissions Projections				Emissions Projections with Select State Measures			
	2005 Emissions (MT CO2e)	2030 Emissions (MT CO2e)	CO2e Change from 2005 (MT CO2e)	Annual Growth Rate	% Change from 2005 to 2030	2030 Emissions (MT CO2e)	State Initiative Reductions (MT CO2e)	Annual Growth Rate	% Change from 2005 to 2030
Buildings / Facilities	1,727	2,630	903	1.70%	52%	1,437	1,193	-0.73%	-17%
Streetlights & Traffic Lights	1,150	1,968	818	2.17%	71%	890	1,079	-1.02%	-23%
Water / Wastewater	4,554	13,674	9,120	4.50%	200%	8,844	4,830	2.69%	94%
Vehicle Fleet	3,761	4,869	1,108	1.04%	29%	3,709	1160	-0.06%	-1%
Transit Fleet	3,793	5,283	1,490	1.33%	39%	4,616	667	0.79%	22%
Airport Facilities	101	173	72	2.17%	71%	83	90	-0.79%	-18%
Employee Commute	1,416	1,703	287	0.74%	20%	965	738	-1.52%	-32%
Solid Waste	-56	-67	-11	0.74%	20%	-67	0	0.74%	20%
TOTAL	**16,446**	**30,233**	**13,787**	**-**	**84%**	**20,476**	**9,756**	**-**	**25%**

3. EMISSIONS REDUCTION ACTIONS

The next step in reducing local emissions of GHGs is to develop a cohesive plan that lays out specific strategies for the City to successfully reduce its emissions. Based on the information revealed in the GHG emissions inventory, a reduction target, which represents a percentage by which the community aims to decrease emissions, is recommended. Additionally, numerous initiatives have taken place since the baseline inventory year of 2005 to help the City and community achieve the reduction target. These actions are described in detail below. In addition to existing initiatives, examples of new measures that the City can potentially implement to meet its reduction target are also described below.

3.1. Reduction Target

A reduction target provides a tangible goal for Visalia's emissions reduction efforts. It is intended to be both aggressive and achievable given local circumstances. Below are the recommended reduction targets for Visalia's community and municipal sectors based on the baseline year emissions and emissions projections estimates:

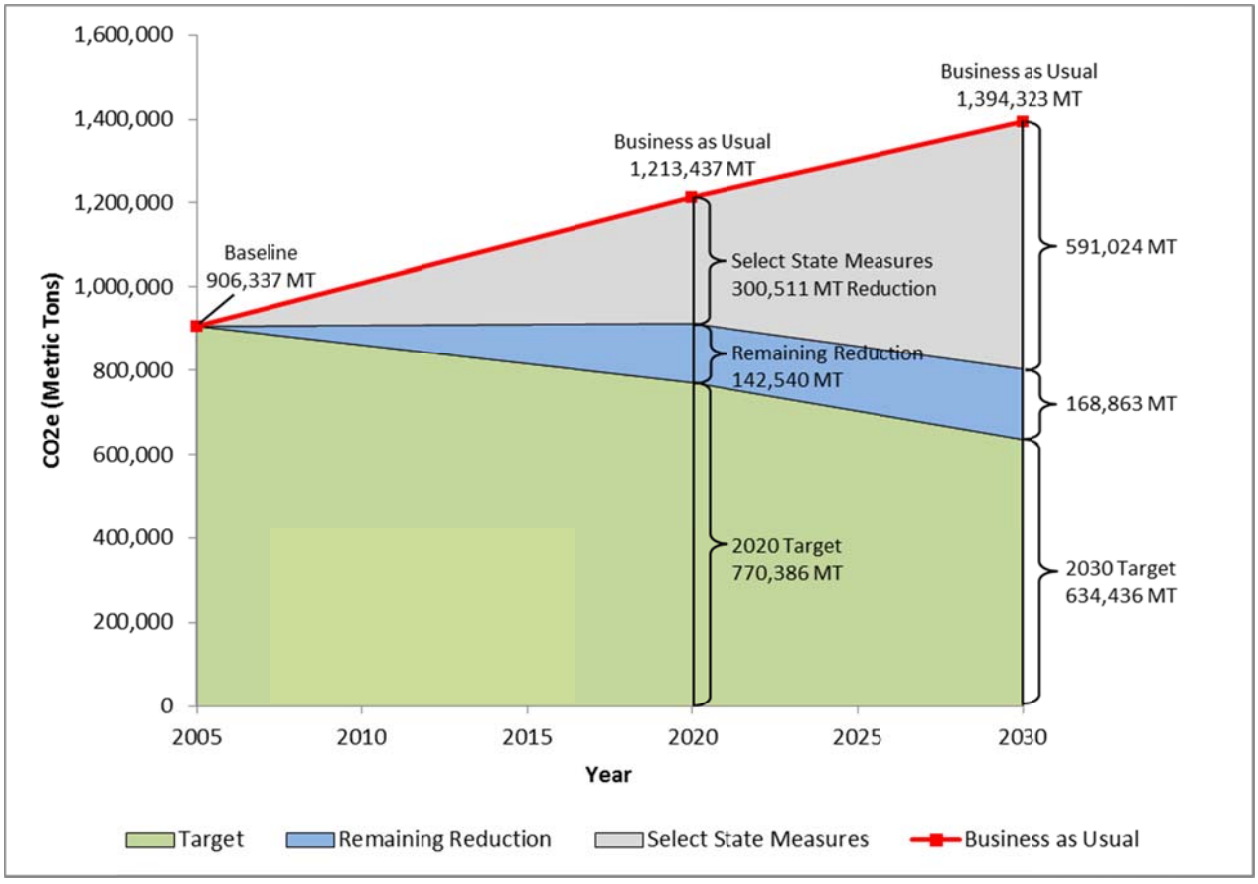
Community and Municipal Sectors:

A reduction target of 15% below 2005 baseline year level by 2020
(ARB's recommended reduction target)

A reduction target of 30% below 2005 baseline year level by 2030
(Strategy consistent with Executive Order S-3-05))

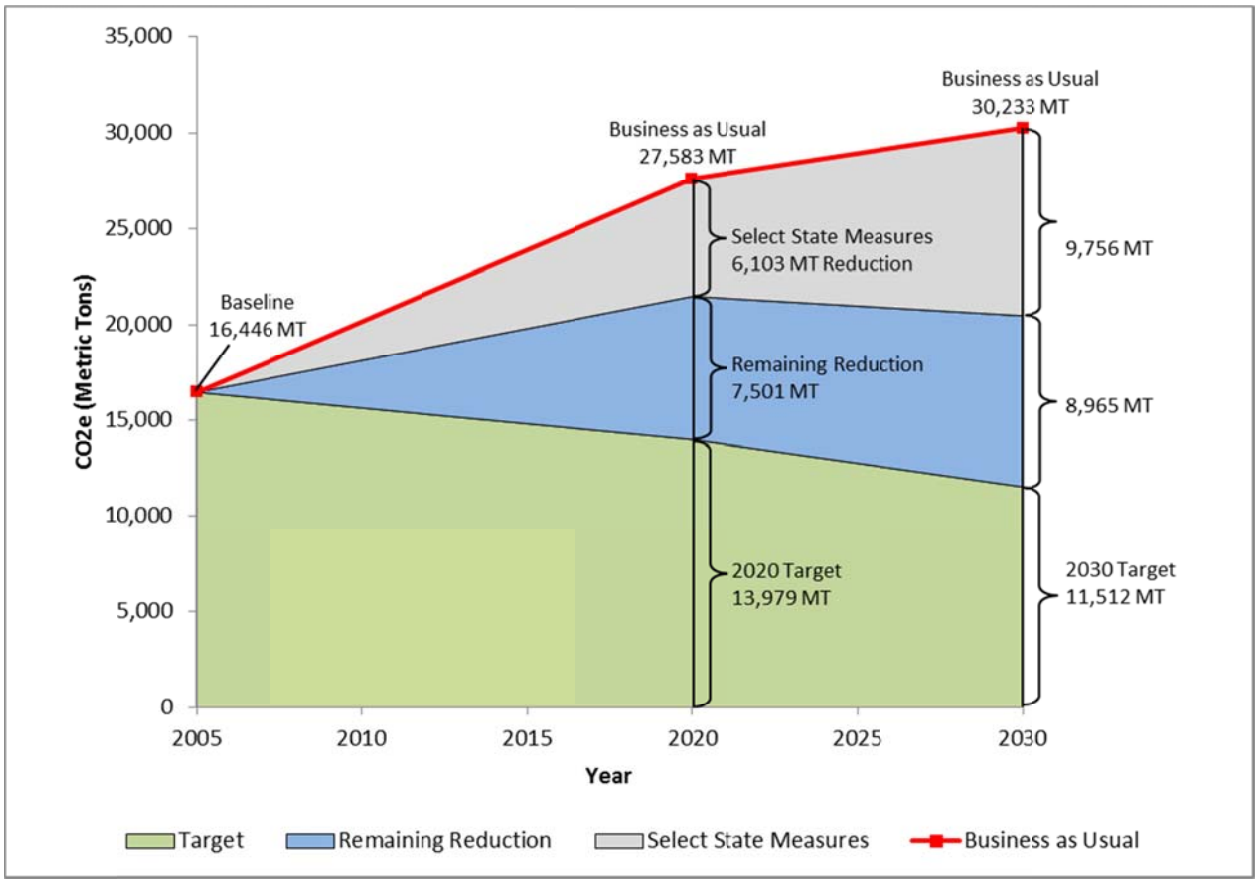
For Visalia's community, the recommended **2020** reduction target of reducing 15% below 2005 emissions level equates to a needed **reduction of 443,051 MT CO2e** (Figure 10). For Visalia's community, the recommended **2030** reduction target of reducing 30% below 2005 emissions level equates to a needed **reduction of 759,887 MT CO2e** (Figure 10).

Figure 10: Visalia Community Greenhouse Gas Emissions and the 2020 & 2030 Mitigation Target (MTCO2e)



For the **municipal sector**, a reduction target of 15% below 2005 emissions level by 2020 was established. To reach this target, a total **reduction of 13,979MT CO2e** will need to achieved. To achieve the **2030** reduction target of 30% below 2005 emissions level, a total reduction of **11,512** MT CO2e will need to be achieved (Figure 11).

Figure 11
Visalia Municipal Greenhouse Gas Emissions and the 2020 & 2030 Mitigation Target (MTCO2e)



For Visalia's community, the recommended **2020** reduction target of reducing 15% below 2005 emissions level equates to a needed **reduction of 443,051 MT CO2e** . By 2020, it is estimated that the community will have reduced its emissions by **55,617 MT CO2e** (or **13%** of total emissions reduction needed) through the implementation of numerous measures (see Existing Measures in Section 3.2.1[41]). Inclusion of projected emissions reductions from select California state initiatives, as mentioned in Section 2.2.3, will result in a further reduction of **300,511 MT of CO2e by 2020**(or **67%** of total emissions reduction needed). This CAP also recommends a series of proposed measures, which would reduce emissions by **89,713** MT CO2e (or **20%** of total emissions reduction

[41] It is important to emphasize that "existing measures" refer to emissions reductions already achieved by the community since the 2005 baseline year as well as emissions reductions from future measures that will be implemented with very high probability.

needed). This results in total emissions reductions of **445,841MT CO2e**, or **101%**, of what is needed to achieve the recommended reduction target for the community.

For Visalia's municipal, the recommended **2020** reduction target of reducing 15% below 2005 emissions level equates to a needed **reduction of 13,604 MT CO2e** . By 2020, it is estimated that the community will have reduced its emissions by **7,014 MT CO2e** (or **50%** of total emissions reduction needed) through the implementation of numerous measures (see Existing Measures in Section 3.2.1[42]). Inclusion of projected emissions reductions from select California state initiatives, as mentioned in Section 2.2.3, will result in a further reduction of **6,106 MT of CO2e** by 2020 (or **44%** of total emissions reduction needed). This CAP also recommends a series of proposed measures, which would reduce emissions by **896** MT CO2e (or **6%** of total emissions reduction needed). This results in total emissions reductions of **14,015 CO2e**, or **103%**, of what is needed to achieve the recommended reduction target for the community.

Figure 12
Visalia Community & Municipal 2020 Mitigation Strategy (MTCO2e)

		Municipal		Community
Mitigation Target 2020		13,604		443,051
Reductions from Select State Measures	(6,104)	↓	(300,511)	↓
Remaining Gap After Select State Measures		7,500		142,540
Existing Measures	(7,015)	↓	(55,617)	↓
Proposed Measures	(896)		(89,713)	
Gap/(Exceed Target}		**(411)**		**(2,790)**
% of Mitigation Target Achieved		**103%**		**101%**

[42] It is important to emphasize that "existing measures" refer to emissions reductions already achieved by the community since the 2005 baseline year as well as emissions reductions from future measures that will be implemented with very high probability.

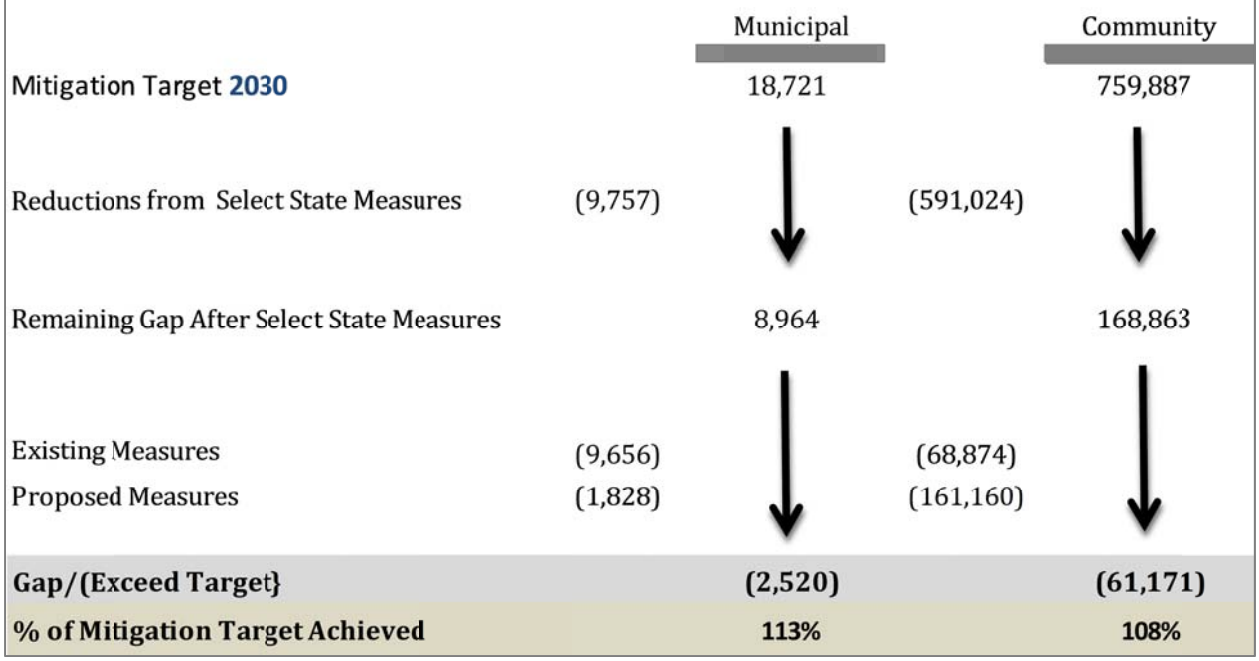
For Visalia's community, the recommended **2030** reduction target of reducing 30% below 2005 emissions level equates to a needed **reduction of 759,887 MT CO2e** (Figure 13). By 2030, it is estimated that the community will have reduced its emissions by **68,874 MT CO2e** (or **8%** of total emissions reduction needed) through the implementation of numerous measures (see Existing Measures in Section 3.2.1[43]). Inclusion of projected emissions reductions from select California state initiatives, as mentioned in Section 2.2.3, will result in a further reduction of **591,024 MT of CO2e by 2030** (or **72%** of total emissions reduction needed). This CAP also recommends a series of proposed measures, which would reduce emissions by **161,160** MT CO2e (or **20%** of total emissions reduction needed). This results in total emissions reductions of **821,058 MT CO2e**, or **108%**, of what is needed to achieve the recommended reduction target for the community.

For Visalia's municipal, the recommended **2030** reduction target of reducing 30% below 2005 emissions level equates to a needed **reduction of 18,721 MT CO2e** (Figure 13). By 2030, it is estimated that the community will have reduced its emissions by **9,656 MT CO2e** (or **45%** of total emissions reduction needed) through the implementation of numerous measures (see Existing Measures in Section 3.2.1[44]). Inclusion of projected emissions reductions from select California state initiatives, as mentioned in Section 2.2.3, will result in a further reduction of **9,757 MT of CO2e** by 2030 (or **46%** of total emissions reduction needed). This CAP also recommends a series of proposed measures, which would reduce emissions by **1,828** MT CO2e (or **9%** of total emissions reduction needed). This results in total emissions reductions of **21,241 MT CO2e**, or **108%**, of what is needed to achieve the recommended reduction target for the community.

[43] It is important to emphasize that "existing measures" refer to emissions reductions already achieved by the community since the 2005 baseline year as well as emissions reductions from future measures that will be implemented with very high probability.

[44] It is important to emphasize that "existing measures" refer to emissions reductions already achieved by the community since the 2005 baseline year as well as emissions reductions from future measures that will be implemented with very high probability.

Figure 13
Visalia Community & Municipal 2030 Mitigation Strategy (MTCO2e)



It is important to note that reduction targets are not absolute; adopted reduction targets should be modified as needed based on periodic inventory updates and changes in municipal operations and community activities. In addition, the Select State Measures and evolving climate change legislation have a notable impact on mandated and selective approaches to mitigating GHG emissions, and should be factored into future updates to Visalia GHG mitigation targets and portfolio of mitigation measures.

3.2. Meeting the Reduction Target

To meet the reduction target, a comprehensive set of actions must be implemented, and GHG emissions from various sources must decrease steadily and significantly over the coming years. This chapter summarizes the existing programs and activities that have been implemented by the City of Visalia since 2006 (after the 2005 baseline year) and describes what new potential initiatives the city government, businesses and citizens can put in place to meet the GHG emissions reduction goals. The measures are organized into the following five categories: Energy Systems, Transportation, Water and Resource Conservation, Transportation / Land Use, and Waste and Resource Conservation.

3.2.1. Existing Emissions Reduction Measures

Overview

Visalia has already instituted many actions since the baseline year 2005 to help the City meet its GHG reduction target. Working closely with City staff, actions that have been implemented by the City since the baseline year 2005 have been identified and information needed to quantify those measures has been collected. In addition to actions that have already been implemented, it is important to note that existing measures referenced here also takes into account identified future measures that will be implemented with very high probability. Estimated annual emissions reductions during the target years 2020 and 2030 are provided for each existing measure below. Assumptions for calculating the GHG benefits of the existing measures are provided in Appendix D.1.

Existing Community Measures

The City of Visalia has already undertaken numerous community-scale measures resulting in reduced GHG emissions relative to the baseline year of 2005 (Table 37). These measures range from the expansion of the City's Bicycle Plan to the implementation of a food scrap composting program. These measures account for about **55,617 MT CO2e** reduction, or **13%** towards Visalia community's recommended reduction goal of 15% below 2005 emissions level by 2020. Many of these measures are also planned to continue through 2030, and they account for **68,874 MT CO2e**, or **8%,** towards the community's recommended reduction goal of 30% below 2005 emissions level by 2030. The measures have been broken down by category and are described below. Methodologies and assumptions used to calculate the estimated GHG emissions benefits of the existing measures are provided in Appendix D.1.

Table 37: Summary of Visalia's Existing Community Measures

Action Category	Existing Actions	2020 Electricity Use Reduction (kWh)	2020 Natural Gas Use Reduction (therms)	2020 Gasoline Use Reduction (gallons)	2020 Diesel Use Reduction (gallons)	2020 CNG Use Reduction (gallons of gasoline equivalent)	2020 Solid Waste Reduction (tons)	2020 Potential CO2e Emissions Reduction (metric tons)	2030 Potential CO2e Emissions Reduction (metric tons)
Energy	1. Solar Photovoltaic (PV) Institutional Barrier Removal	1,818,126	-	-	-	-	-	523	676
	2. Solar PV Installations	31,665,326		-	-	-	-	9,115	11,782
	3. Energy Upgrade CA	670,707	31,770	-	-	-	-	365	472
	4. Southern California Edison Small Business Direct Install Program	41,143,380	-	-	-	-	-	11,843	15,309
	5. Southern California Gas Weatherization Program	1,192,882	385,610	-	-	-	-	2,393	3,093
	6. CSET Weatherization Program	390,576	126,257	-	-	-	-	784	1,013
	7. Urban Forestry	1,772,400	-	-	-	-	-	3,384	5,802
	8. Compact Fluorescent Light (CFL) Bulbs							14,524	14,715
Transportation	9. Sequoia National Park Shuttle Bus	-	-	16,610	-	-	-	149	193
	10. Bicycle Path Expansion	-	-	2,191	-	-	-	20	26
	11. Vi-Cycle Pilot Program	-	-	849	-	-	-	8	10
	12. Dare to Spare Program	-	-	48	-	-	-	0.4	1
	13. Increase in Transit Ridership (City Transit Buses)							1,183	1,529
	14. Traffic Light Synchronization	-	-	277,592	6,304	76	-	2,561	2,923
Waste and Resource Conservation	15. Waste-to-Energy Program	-	-	-	-	-	1,416	493	637
	16. Construction & Demolition Recycling	-	-	-	-	-	9,191	8,051	10,407
	17. Yard Waste / Food Scrap Composting	-	-	-	-	-	1,105	221	286
TOTAL		**78,653,397**	**543,637**	**428,892**	**6,304**	**76**	**11,712**	**55,617**	**68,874**

ENERGY

1. Solar Photovoltaic (PV) – Institutional Barrier Removal

The City participated in an initiative called the Southwest Solar Transformation Initiative (SSTI), a regional team of public and private entities committed to advancing solar power adoption across the partner municipalities in the Southwest United States[45]. The SSTI, part of the U.S. Department of Energy's Rooftop Solar Challenge, is funded to increase solar PV installations by streamlining and standardizing permitting, zoning, metering and connection processes, and improving finance options for residential and commercial rooftop solar system. By being an active partner in this regional initiative, the City hopes to continue to lead its community to be to be leaders in solar PV.

By being a partner in SSTI, the City will be able to deploy an integrated effort designed to:

- Identify major solar market transformation hurdles;
- Evaluate solar power potential within its community;
- Develop a roadmap for streamlining and standardizing permitting, zoning and interconnection processes in collaboration with all relevant stakeholders;
- Provide guidance on applicable solar project financial and economic models for residential and commercial property owners;
- Leverage Department of Energy materials, partners, and best practices; and
- Prepare for expanding those more successful approaches in future projects.

As a result of SSTI participation, it is estimated that an additional 1,107 kW of PV capacity will be installed in Visalia's community.

2. Increase in Solar Photovoltaic (PV) Installations

As community members are becoming more aware of the need to address climate change, many members are looking to contribute to the cause by purchasing/investing in solar PV systems. In addition to helping the environment, solar PV systems also helps to reduce electricity costs. With prices for solar systems becoming more and more cost effective and the federal government and the State providing attractive incentives for solar, solar investments are expected to continue to grow in the future.

3. EnergyUpgrade California

EnergyUpgrade California™ is a statewide program that offers incentives to homeowners who complete select energy-saving home improvements on a single-family residence and two to four unit buildings such as a townhouse, condominium, as well as homeowners associations with either single family homes or two to four unit buildings. These incentive packages encourage customers to take a "whole house" approach by combining several related improvements at once to increase a home's overall energy efficiency and achieve greater savings. EnergyUpgrade provides a financial incentive to install energy efficiency improvements, and the City will continue to market the program so the community is aware of the program. Additional information can be found at https://energyupgradeca.org.

[45] http://www.solarroadmap.com/ssti/

4. Southern California Edison Small Business Direct Install Program

Southern California Edison (SCE) has contracted with energy efficiency experts that will provide the following free services to SCE business customers. The business package includes the following services:

1. Energy evaluation and savings analysis
2. Energy-efficient products that include:
    - Fluorescent Lighting — Lighting upgrades can save up to 42% on lighting costs every month and help lower cooling costs.
    - Refrigeration — Gaskets, door closers, suction line insulation, and strip curtains to improve the energy-efficient operation of your refrigeration equipment.
    - LED Signs (Open and Exit) — LED sign upgrades can helps save 90% on signage electricity costs.
    - Window Film — Applying heat-rejecting window film is a low-cost way to help reduce both solar heat gain in the summer and heat loss in the winter.
    - Occupancy Sensors — Sensor lighting controls that turn off lighting when a space is unoccupied can reduce energy use by up to 50%.
    - Vending Misers — Energy efficiency product for vending machines that saves money by managing power consumption.
    - Programmable Thermostats — One of the easiest ways you can save energy, money, and help fight global warming.
3. Installation of energy efficient products listed above.

Additional information on this program can be found on SCE's website: www.sce.com/directinstall. The SCE Direct Install team worked in the community of Visalia in 2011, and the City is working with the VIEW Partnership to coordinate future Direct Install opportunities for businesses in Visalia.

5. Southern California Gas Weatherization Program

Since the inception of Southern California Gas Company's (SoCalGas) weatherization program in October of 2010, Proteus has provided services to 3,800 homes in Visalia. Proteus is directly funded by SoCalGas to provide the Energy Savings Assistance Programs to its customers. The following list is the standard services available to qualified applicants through the SoCalGas weatherization program:

- Furnace and water heater repair/replacements
- Window and Door repair/replacements
- Weather-stripping and caulking
- Water heater blanket and pipe insulation
- Low flow shower heads and faucet aerators
- Attic insulations
- Cooler covers
- Switch and outlet covers
- A/C clean and tunes

6. Community Service Employment Training Weatherization Program

Community Service Employment Training (CSET), a private nonprofit corporation that serves as the community action agency for Tulare County, has been working closely with Visalia's low-income residents for a number of years to weatherize their homes. CSET's Weatherization Program is a free program given to low-income families who own or rent an apartment, home or mobile home in Tulare County. Eligibility is based on income.

The goal and purpose of weatherization is to prevent a dwelling from having "air infiltration" as well as conserving water usage. By preventing air infiltration and conserving water the energy burden is reduced, which also reduces the cost of utility bills. The Weatherization Program provides services to low-income families in Tulare County. Weatherizing a dwelling consists of an in-home assessment that checks for gas appliance malfunctions and air infiltration.

Weatherization measures provided by CSET include the following:

- Weather striping all exterior doors
- Water restrictors
- Low flow showerheads
- Water heater blankets
- Switch and outlet gaskets
- Carbon monoxide detectors
- Glass and window replacement
- Furnace repair or replacement
- Gas appliance repair or replacement
- Other minor home repairs

CSET uses its Sequoia Community Corps to provide the labor for these weatherization services. Corps members, supervised by CSET's certified on-staff contractors, develop useful skills while getting on-the-job training.

The weatherization services are funded by the Department of Community Services & Development (CSD) through two grants: 1) Low Income Home Energy Assistance Program (LIHEAP) and 2) Department of Energy/American Reinvestment and Recovery Act (DOE/ARRA).

For additional information on the program, please visit: http://www.cset.org/services/individuals-families/housing-services/home-weatherization

7. Urban Forestry

The Urban Forestry Division administers the long-term urban forestry policies for the City and conducts plan review for all new development. In 2000, the City established a partnership with the Urban Tree Foundation to plant over 3,000 trees in the Downtown and along streets and medians. Data available from the Urban Tree Foundation's website indicates that over 4,400 trees have been planted throughout Visalia by the foundation since 2000. In 2004, the City Council adopted the Street Tree Ordinance, which requires all new commercial and residential development to plant street trees. Additionally, landscape standards require shade over at least 25% of area in city pocket parks. City staff estimates that the Urban Tree Foundation plants 700-800 trees on average each year. The emissions reductions for urban forestry take into consideration both electricity use reduction from increased shade of buildings and carbon reduction from carbon sequestration.

8. Compact Fluorescent Light (CFLs): Encourage the use of CFLs throughout the community

In the average U.S. home, lighting accounts for about 20% of the electric bill.[46] Compact fluorescent light bulbs (CFLs) are one of the simplest and most cost-effective energy saving measures people can take in their homes. CFLs use about 75% less energy than incandescent bulbs, according to the U.S. Department of Energy. If every home in the United States replaced an incandescent bulb with a CFL bulb in just one light fixture, the country would save more than $600 million in energy costs per year, reducing GHG emissions by the equivalent of removing 800,000 cars from the road.[47]

The City will continue to collaborate through the VIEW Partnership to identify opportunities to encourage community members to purchase CFLs for their homes is to hold promotional CFL giveaway days. Several cities have already partnered with other organizations, including the federal government's ENERGY STAR program in their Change a Light, Change the World initiative[48], which encourages families to replace just one incandescent bulb with a CFL. San Diego partnered with the Scripps Institute of Oceanography to offer free light bulb and torchiere exchange and 2 for 1 admission to the aquarium for those who exchanged.[49]

In another example, Kansas City launched the A Million (Compact Fluorescent) Lights Program and encouraged all city employees to change on light bulb in their homes with a CFL for each family member.[50] In addition to the efficient bulbs residents take home, a giveaway raises awareness of the benefits of CFLs, encouraging participants and their neighbors to buy additional bulbs on their own. Promotional giveaway programs can also be quite effective when coupled with other energy efficiency programs, such as Energy Upgrade CA or a low-income weatherization program.[51]

TRANSPORTATION

9. Sequoia National Park Shuttle Service Bus

In 2007, the City began running a shuttle service from Visalia to Sequoia National Park. Sequoia Shuttle's external shuttle service provides affordable, convenient, and comfortable transportation from Visalia to the majestic Sequoia National Park, seven days a week, during summer. Though most Park visitors arrive by private vehicle, the increasing number of motor vehicles in the Nation's Parks threatens the very resources the Parks were intended to protect. Sequoia National Park receives over 1 million visitors every year. More visitors results in more traffic on Park roads and parking areas, resulting in lengthy delays and roadway congestion. This congestion translates to air and noise pollution which threatens the fragile natural and cultural resources within the Parks. Sequoia Shuttle also operates four free in-park routes within Sequoia National Park. No tickets are required, and bus stops are clearly marked throughout the Park. This bus service currently consists of a fleet of 12 gasoline-driven buses that operate 109 days of the year. The annual average ridership for this bus service is approximately 7,041.

[46] ENERGY STAR website: http://www.energystar.gov/index.cfm?c=lighting.pr_lighting
[47] Source: ICLEI CAPPA.
[48] Change a Light, Change the World Campaign: http://www.energystar.gov/index.cfm?fuseaction=globalwarming.showPledgeHome
[49] For more information, see: http://scrippsnews.ucsd.edu/Releases/?releaseID=822.
[50] For more information, see: www.kcmo.org/manager.nsf/web/cpp
[51] Source: ICLEI CAPPA.

10. Bicycle Path Plan

Visalia has an excellent system of multi-use paths that are well suited to biking. Currently, the cumulative distance of bicycle paths and trails within the City total 27.7 miles. Through acquisition and construction, the City plans on extending the total distance of bicycle paths, lanes and trails to 140 miles by 2020 and will continue expanding bicycle paths through 2030.

11. Vi-Cycle Program

The City of Visalia believes in the benefits of bikes, buses, and hybrid vehicles. Reducing our dependency on automobiles can help conserve natural resources and improve air quality. The City's "Vi-Cycle" program takes recovered bicycles from the Police Department, Transit and other sources, refurbishes them and then distributes them to businesses for use by employees or customers in the community. This program is intended to reduce car emissions and congestion, save money, improve air quality and utilize recycled bicycles in the community. The City hopes to keep expanding the program through 2020 and 2030.

12. Dare to Spare Challenge

Dare to Spare Challenge is a city-wide challenge implemented by the City's Transit Division that encourages teamwork, rewards clean practices, and educates the community on the simple things we can do to positively impact air quality. The Dare To Spare competition is the product of the 2006 Visalia Leadership Class project as a means to engage the general public and encourage the use of alternative forms of transportation. Participants are encouraged to: bicycle, walk or use public transit to and from their jobs, schools and appointments rather than use private vehicles. The Visalia Transit Division has always been a strong supporter of the program and has ultimately assumed responsibility for the program after its inaugural year. The campaign was extended in 2012 to go from a weeklong event to a 30-day event.

To sign up for the Dare to Spare Challenge, the interested participant will need to create a group of three teammates. These teammates can be friends, family or co-workers. At the start of the campaign, the participant logs onto the Dare to Spare website each day and record all the various ways the team has spared the air (e.g. riding Visalia Transit or Trolley, biking instead of driving, etc.). Team points will be calculated and at the end of the Dare to Spare Challenge and the top three teams with the most points win. Each winning team member will be awarded a prize package with goodies from local merchants.

It is the Transit Division's intent to continue this event as a staple of its annual marketing activities and build upon its existing success. For additional information on this program, please visit: http://www.daretospare.com.

13. Increase in Transit Ridership

The City has been working hard to promote the use of the City's public transit systems, in particular transit bus services. For example, Visalia Transit hosted the "Make an Impression" campaign where over 80 green footprints were painted around town prompting the largest Earth Day event to date and Transit continues to be an annual Earth Day participant. Visalia Transit also utilizes social media, and has a very active and ever-growing Facebook page that interacts with fans each day, giving them different tips, facts, updates and promotions. Since 2005, ridership for the City's transit

service increased by 47% from 1,184,088 to 1,737,093 in 2012. These increases in ridership undoubtedly have a significant impact on emissions reductions for the community.[52]

14. Traffic Light Synchronization

The City of Visalia will be installing advanced technology systems and implementing effective management strategies in order to improve the operational efficiency of transportation systems and the movement of people, goods, and services, including synchronization of traffic lights and signals. The system is expected to reduce GHG emissions since synchronizing traffic lights will reduce idling times of vehicles, which waste unnecessary fuel. This measure will be implemented along the following city corridors:

- Akers Street – Cypress Avenue to Whitendale Avenue
- Caldwell Avenue – Akers Street to Santa Fe, excluding Mooney Blvd.
- Whitendale Avenue – Linwood Street to County Center Street
- Demaree Street – Whitendal Avenue to Campus Avenue
- Mineral King & Noble Avenue – Giddings Street and West Street

WASTE & RESOURCE CONSERVATION

15. Waste-to-Energy Program

The Waste-to-Energy Program began in 2005. The City of Visalia belongs to the Consolidated Waste Management Authority, a joint powers authority (includes seven cities and Tulare County) that ships a small percentage of its solid waste to be incinerated at a transformation facility in Long Beach. Based on estimates from 2006-2009, approximately 1,416 tons of waste from Visalia are incinerated each year. This percentage is subject to change, however, in subsequent years, depending on funding that is available. The program ended in 2009.

16. Construction & Demolition (C&D) Debris Recycling Program

Visalia's C&D debris recycling program began in 2006. It requires all major construction and demolition related projects in the City to recycle their waste including, waste building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition operations on pavements and structures. The requirement for C&D debris recycling for the City is 50% of all C&D waste generated.

17. Yard Waste/Food Scrap Composting Program

The City of Visalia has had a yard waste collection service specifically for the residential sector since 1985. The yard waste program was expanded to service the commercial sector in 2006. To promote this new service, the City implemented a commercial green waste/recycling audit program where the City visits individual businesses, studies their waste stream, and makes recommendations on how local businesses can save money by reducing the landfill solid waste content by increasing their green waste and recycling content. The City continues to offer the audit program to local businesses. The City's yard waste service was yet again expanded to

[52] Visalia's trolley service is not included as an existing measure because ridership decreased by 67% between 2005 and 2012 (from 96,135 to 31,537) as a result of service reduction.

include food scrap composting in 2009 with the start of a pilot program for the residential sector. The program was expanded to the commercial sector in 2010. Starting in 2012, the City's Natural Resource Conservation Division and Solid Waste Division began targeting commercial accounts that would benefit from adding food scrap composting services. The City will continue to offer commercial waste audits and utilize every opportunity to educate the community on the benefits of yard/food waste composting.

Other Community Measures

One of the indirect benefits of installing smart meters is the reduction of vehicle miles traveled for utility staff. Since meter readings and other services will be able to be completed on-site at the utilities' offices/facilities, this will result in a decrease in vehicle use. Although information for estimating the VMT reduction currently does not yet exist (based on conversations with both SCE and SoCalGas), in future inventory updates, this measure may potentially be integrated as an existing community measure when/if reliable and accurate information becomes available.

Existing Municipal Measures

The City of Visalia has also already undertaken a number of municipal operations measures resulting in reduced GHG emissions relative to the baseline year of 2005 (Table 38). These measures range from LED traffic and pedestrian lights to CNG transit buses. These measures already account for **7,014 MT CO2e** reduction, or 50% towards Visalia's recommended municipal operations reduction goal of 15% below 2005 emissions levels by 2020. In addition, the measure that are likely to continue through 2030 have been quantified, and account for **896 MT CO2e** reduction, or 45% towards Visalia's recommended municipal operations reduction goal of 30% below 2005 emissions levels by 2030. Mitigation measures have been broken down by category and are described below. Methodologies and assumptions used to calculate the estimated GHG emissions benefits of the existing measures are provided in Appendix D.1.

Table 38: Summary of Visalia's Existing Municipal Operations Measures

Existing Actions	2020 Electricity Use Reduction (kWh)	2020 Natural Gas Use Reduction (therms)	2020 Gasoline Use Reduction (gallons)	2020 Diesel Use Reduction (gallons)	2020 Potential CO2e Emissions Reductions (metric tons)	2030 Potential CO2e Emissions Reductions (metric tons)
y Lighting Upgrades (Convention Center Exhibit Parking Structure, and West Parking Structure)	406,392	-	-	-	117	117
Substations	11,744	-50	-	-	3	4
Upgrades	48,900	1,126	-	-	20	20
oad Occupancy Sensors	42,710	-	-	-	12	12
g and Equipment Upgrades (California Energy ion Loan)	811,853	9,378	-	-	284	1,756
raffic & Pedestrian Lights	240,158	-	-	-	69	89
Pump Upgrades	30,370	-	-	-	8	8
t - Solar PV	49,275	-	-	-	14	14
elters - Solar PV	3,351	-	-	-	1	1
it Center - Solar PV	8,311	-	-	-	2	3
r Conservation Plant Renewable Energy Systems - and Microturbines	8,220,182	-	-	-	2,366	2,366
Vehicles						
Solid Waste	-	-	-	78,571	803	1,038
Dial-A-Ride	-	-	16,091	-	145	187
Transit	-	-	-	279,956	2,861	3,698
Trolleys	-	-	-	4,396	45	58
d Electric Sedans	-	-	29,413	-	264	284
	9,873,248	**10,454**	**45,504**	**362,924**	**7,911**	**11,485**

ENERGY SYSTEMS

1. Facility Lighting Upgrades

The City completed lighting retrofits at three facilities – Convention Center Exhibit Hall, the East Parking structure, and the West Parking structure. At the Convention Center Exhibit Hall, the City replaced mercury vapor lights and quartz lighting with T-5 fluorescent lamps. At the East Parking Structure the City replaced T-8 lamps with bi-level T-8 fluorescent lamps. At the West Parking Structure metal halide lamps were replaced with bi-level T-8 fluorescent lamps. At both parking structures lighting on interior floors was replaced with bi-level lights and motion sensors. At the roof level, sodium lights were replaced with LEDs. These lighting retrofits are expected to save the City 406,390 kWh/year.

2. Police Substations

In 2007, the City completed the construction of two police substations. As part of the construction, significant efforts were made to make them energy efficient, including daylighting through skylights, efficient lighting with motion controls, and high efficiency HVAC systems with demand controlled ventilation. For this project, the City participated in SCE's Savings By Design program and received rebates based on the installed energy efficient measures. The energy efficient construction is expected to save over 3 MT CO2e annually.

3. HVAC Upgrade

In 2011, the City completed 22 heating, ventilation, and air conditioning (HVAC) upgrades at three facilities – Anthony Community Center, City Hall West, and the Convention Center. Old, inefficient HVAC units were replaced with ENERGY STAR units rated Tier 1 with a seasonal energy efficiency ratio (SEER) of 14. These HVAC is estimated to save the City 48,900 kWh/year and 1,126 therms/year.

4. Plug Load Occupancy Sensors

The City installed 502 plug load occupancy sensors (IPAN occupancy sensors offered by California Energy Efficiency Program). The occupancy sensors detect motion in the workspace. When the workspace is unoccupied for 30 minutes, the power strip shuts off power to selected outlets – leaving power on only for the devices that need it. When the sensor detects motion in the workspace, power is restored. Cumulatively, the occupancy sensors are expected to save the City 42,710 kWh annually.

5. Lighting & Equipment Upgrades through the California Energy Commission (CEC) Loan

In 2011 and 2012, BASE Energy, Inc. prepared energy audits that identified a number of lighting and equipment upgrades the City of Visalia could undertake at approximately 19 municipal facilities to save energy and reduce utility expenses. Many of the upgrades are planned to be implemented the fourth quarter of 2013 through a $500,000 CEC loan to realize significant energy savings. The retrofits include high efficiency fluorescent lighting, installation of automatic lighting controls, LED exterior lighting, vending machine controllers, daylight sensors, and programmable thermostats. These retrofits are expected to save the City 811,853 kWh and 9,378 therms annually.

6. LED Traffic & Pedestrian Lights

Starting in 2000, Visalia began a program of replacing the incandescent indicators in their traffic signals with LED indicators. LED indicators save a significant amount of energy as compared to conventional incandescent indicators (upwards of 80%). The City completed the LED traffic light upgrade in 2011, which replaced over 1,300 incandescent indicators with LED lights at the City's 78 street intersections. Based on the most recent SCE incentive calculations from the latest LED retrofit project, this LED retrofit project is estimated to save the City 240,158 kWh/year.

7. Water Pump Upgrades

The City recently upgraded a wastewater pump and will continue to identify opportunities to utilize more efficient pump equipment. This is estimated to save 27,831 kWh and $3,523 annually on utility costs. The City's Parks and Recreation department also upgraded a water pump for the Valley Oaks Golf Course. The energy savings from this upgrade is estimated to be 2,539 kWh/year. The City actively seeks additional opportunities to utilize more energy efficient water pump equipment.

8. Airport Solar PV

In 2006, Visalia installed a 30 kW solar PV system at the Visalia Municipal Airport. 150 panels were mounted on top of a new parking lot canopy immediately west of the Business Aviation terminal. A total of 21 panels were attached to a new awning on the south side of the terminal facing the airport's runways. The 30 kW solar PV system is producing about 49,275 kWh annually.

9. Solar PV Bus Shelters

Visalia began installing solar PV units on bus stop shelters in 2008. Currently, there are 51 solar units installed, which represents 43% of the 118 bus shelters. The solar units are 40-Watt panels with a Morningstar controller. They power LED lights that are programmed to come on at dusk and go off before dawn. They are connected directly to the LED light. City policy is to provide solar units to every new bus shelter. However, they are not practical on some shelters where there is no access to sun for enough hours to charge the system. Currently, the City installs solar units on any shelter where feasible when the shelter is either replaced or refurbished. The solar systems on the bus shelters are producing about 3,351 kWh annually.

10. Transit Center Solar PV

A 4.7 kW system was installed on the roof of the Transit Center in 2003. In 2011, a second solar PV system (5 kW) was installed on the canopy of the bus shelter waiting area in the Transit Center. Funding was obtained from FTA-ARRA Grant. Only the recently installed solar system will be taken into account in the CAP since the first system was installed prior to 2005. The 5 kW solar PV system are producing about 8,311 kWh annually.

11. Water Conservation Plant Renewable Energy Systems – Solar PV and Microturbines

The City is in the process of completing a comprehensive upgrade of its WCP, converting it from a secondary treatment system to an advanced tertiary treatment facility. The conversion will include the installation of three 250 W of micro-turbines fed by the plant's methane digesters and a one MW solar PV installation. The micro-turbines are expected to reduce annual average utility electricity purchases by 6,532 MWh per year. A 1 MW solar PV system would be ground mounted

on a single axis tracking system to improve the overall system efficiency. The solar system is expected to generate 1,688 MWh annually.

TRANSPORTATION

12. Compressed Natural Gas Vehicles

Over the years, the City of Visalia has been switching to CNG vehicles for many of its operations, ranging from solid waste pick up to transit services.

- CNG Solid Waste Trucks
  The first CNG solid waste trucks were purchased by the City in 2004 to cut reliance on high-cost diesel and associated emissions. The City currently owns and operates approximately 40 CNG solid waste trucks. The entire solid waste fleet is expected to run on CNG by about 2016.

- CNG Dial-A-Ride (DAR) Buses
  The first CNG DAR Buses were purchased by the City in 2002 to cut reliance on high-cost gasoline and associated emissions (all DAR buses were gasoline-driven until 2002). The City currently has 12 DAR buses running one CNG. The DAR services provide curbside pick-up for residents of Visalia, Goshen, and Farmersville. Estimates from Transit show that 62.4% of trips are within Visalia.

- CNG Transit Buses
  The City purchased its first CNG transit buses in 2002 to cut reliance on high-cost diesel and associated emissions. CNG transit buses replaced diesel-run transit buses within the City's "Visalia Transit" services. Visalia Transit serves all neighborhoods of Visalia to bring residents to major shopping centers, medical centers, and work sites. The City currently owns and operates 24 CNG transit buses.

- CNG Trolleys
  First CNG Trolleys were purchased in 2008 to replace the older diesel trolleys. There are a total of three CNG trolleys. This trolley service serves the Downtown District and the Mooney Blvd retail corridor.

13. Hybrid Electric Sedans

First hybrid electric sedans were purchased by the City in 2002. These vehicles are used to replace vehicles within City Administration, Engineering, Buildings, Police and Fire Departments. These vehicles were purchased for their increased fuel efficiencies and decreased emissions. The City currently owns and operates a total of 26 electric hybrid sedans. In addition, the City purchased two electric motorcycles in 2013, and will continue to explore the opportunity to utilize lower-carbon vehicles through municipal operations.

Other Municipal Measures

In addition to the existing measures discussed above, the City of Visalia is also currently updating its 2030 General Plan (expected to be completed in January 2014). As part of the update, overarching long-term comprehensive objectives and policies for addressing climate change and

reducing resource use and GHG emissions are being integrated into the 2030 General Plan Update. A list of those objectives and policies are provided in Appendix D.2.

3.2.2. Proposed Emissions Reduction Measures

Overview

While Visalia has been actively pursuing more efficient and cleaner energy, transportation, and solid waste practices, it is clear that Visalia will need to do more to reach the recommended reduction targets. Achieving the reduction goal will require significant additional efforts by all City staff as well as all members of the community. Fortunately, there are numerous measures that can be implemented, many of which have already been implemented by other local governments, that both the City and the community of Visalia can implement to successfully reduce GHG emissions. Below are descriptions of the proposed measures. This section includes an analysis of the different types of reduction measures that are proposed through implementation of this CAP. By no means is this the be-all-end-all list of potential measures that the City can implement. Over time, with the expansion of current emission reduction tools and resources and the emergence of new ones, we highly encourage the City to revisit this initial list periodically to expand and modify it appropriately to reflect the changes within the City and the community.

High priority proposed measures were identified based on an online survey that was distributed to Visalia's City managers, Department managers, and the City's Environmental Committee (a total of 45 surveys out of 100 were completed, which represents a 45% participation rate). The survey included specific questions regarding the types of actions that they thought would be most advantageous for the City in terms of reducing emissions (See Appendix E.1.). As City department managers and involved citizens of the City, they are in an excellent position to give Visalia valuable insight into the actions that are important and effective in reducing emissions. The City's Natural Resource Conservation staff also provided critical feedback on identifying potential new measures that are a good fit for Visalia. In addition, policies in the 2030 General Plan Update were evaluated for their potential impact on GHG emissions, and mitigation measures were developed in the Land Use category to reflect the positive impacts of those policies on reducing GHG emissions.

Once the high priority proposed measures were identified, ICLEI's Climate and Air Pollution Planning Assistant (CAPPA) tool (version 1.5) was utilized for many of the identified measures to calculate estimated emissions (see below and Appendix E.2. for CAPPA inputs and assumptions). Additional optional measures that the City could consider in the future are listed in Appendix E.3. CAPPA provides a comprehensive, customizable and expandable library of emissions reduction strategies relevant for local governments, as well as decision support capability to assist local governments in identifying strategies for inclusion in their emissions reduction plans. It also provides information and quantification tools for over 100 distinct emissions reduction strategies. Default assumptions regarding average degree of implementation and resulting performance of each strategy are based on real-world data from other U.S. communities and a variety of expert sources.

Measures

Table 39: Summary of Visalia's Proposed Community Measures Impact

Proposed Actions	2020 Electricity Use Reduction (kWh)	2020 Natural Gas Use Reduction (therms)	2020 Gasoline Use Reduction (gallons)	2020 Water Savings (million gallons)	2020 Cost Savings (thousands)	2020 Potential CO2e Emissions Reduction (metric tons)	2030 Potential CO2e Emissions Reduction (metric tons)
GY STAR Appliances & Equipment							
mmercial / Industrial Sector							
. Computers	238,587	-	-	-	$35	69	89
. Monitors	72,407	-	-	-	$10	21	27
. Copiers	891,746	-	-	-	$133	257	332
. Printers	440,116	-	-	-	$66	127	164
idential Sector							
. Refrigerators	6,284,880	-	-	-	$942	1,809	2,338
. Window A/C Units	1,286,775	-	-	-	$193	370	478
. Dishwashers	1,415,750	102,129	-	6	$295	950	1,228
. Clothes Washers	1,544,371	33,659	-	94	$259	623	805
nunity-wide Solar PV Bulk Purchasing	-	-	-	-	-	142	184
rty Assessed Clean Energy (PACE) Program						21,959	52,942
y Efficiency Marketing & Programs						12,045	13,839
a Unified School District (VUSD) Solar Program						2,260	2,260
r Efficient Landscaping Policy	5,280,355	-	-	1,508	$3,507	1,520	1,965

Water and Resource Conservation	7. Water Efficient Landscaping Promotion and Education	2,640,178	-	-	754	$1,753	760	982
Transportation / Land Use	8. Transit Oriented Development	-	-	774,508	-	$3,159	6,962	8,999
	9. Electric Vehicle promotion, including Plug-in Electric Vehicle (PEV) Charging Stations	-	-	-	-	-	7,940	33,707
	10. Local, Low-Carbon Transportation Education	-	-	285,781	-	$1,166	2,569	3,321
	11. Infill and Higher Density Development						16,006	20,335
	12. CNG Public Fueling Stations						3,340	5,204
Waste and Resource Conservation	13. Anaerobic Digestion						**9,991**	**11,959**
TOTAL		**20,095,165**	**135,788**	**1,060,289**	**2,362**	**11,518**	**89,712**	**161,160**

Table 40: Summary of Visalia's Proposed Community Measures Implementation Plan

Action Category	New Actions	Responsible Implementer(s)	Timeframe	Potential Funding and Financing Options
Energy Systems	1. ENERGY STAR Appliances & Equipment: Promote purchasing of energy efficient (e.g. ENERGY STAR) home and office appliances and equipment.	Community / City - Natural Resource Conservation Staff	Short-term / Medium-term	- Community: No/limited funding needed because there is little/no price difference between ENERGY STAR and conventional equipment - City: The City will work to identify opportunities to collaborate to promote the utilization of ENERGY STAR equipment, including the potential to develop outreach programs through the Valley Innovative Energy Watch (VIEW) partnership.
Energy Systems	2. Community-wide Solar PV Bulk Purchasing: Continue to promote community-wide rooftop solar. Continue exploring the potential to collaborate with regional partners on a community-wide solar bulk purchase program.	Community / City - Natural Resource Conservation Staff	Medium-term	- 30% Federal tax credit (U.S Treasury Department-sponsored Investment Tax Credit) - California Solar Initiative's PV Incentives (state rebate program) - California Energy Commission's Energy Efficiency Financing - low interest loan for energy efficiency and renewable energy projects - Solar Mosaic - Property Assessed Clean Energy (PACE) financing (commercial sector) For additional information: - http://www.dsireusa.org/solar/incentives/incentive.cfm?Incentive_Code=CA134F&re=1&ee=1 - www.energy.ca.gov/efficiency/financing - https://joinmosaic.com - http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/pace.html
	3. Property Assessed Clean Energy (PACE) Program: Work to establish PACE financing which supports energy efficiency and renewable energy projects by providing up-front capital that is subsequently paid back through a special assessment on participants' property taxes, to be implemented in conjunction with SCE incentive opportunities.	Community / City - Natural Resource Conservation Staff	Short-term / Medium-term	Property assessed clean energy (PACE) financing supports energy efficiency and renewable energy projects by providing up-front capital that is subsequently paid back through a special assessment on participants' property taxes. Visalia has approved participating in CaliforniaFIRST. The program finances energy and water improvements on commercial properties. The program will be structured to maximize the available SCE energy efficiency incentives. For more information, visit: https://californiafirst.org/overview

Action Category	New Actions	Responsible Implementer(s)	Timeframe	Potential Funding and Financing Options
Energy Systems	4. Energy Efficiency Marketing & Programs: Providing public education on the need for energy efficiency, emissions reduction programs, and cost savings associated with energy-efficient buildings; continue co-branding programs with the VIEW, SCE and SoCalGas through Public Goods Funds, facility benchmarking through AB1103, and other energy efficiency program opportunities.	Community / VIEW / City - Natural Resource Conservation Staff	Short-term / Medium-term / Long-term	-Valley Innovative Energy Watch Partnership http://www.viewthesavings.com/ Central Valley Energy Tune-Up http://www.centralvalleyenergytuneup.org/ - PowerSaver Loan Program http://www.egia.org/swmc/ -CRHMFA Homebuyers Fund (CHF) Residential Energy Retrofit Program http://www.chfloan.org/Programs/Energy/energy_program.html - Educational Employees Credit Union (EECU) Energy Efficiency Loan http://www.myeecu.org/home/loans-credit-cards/personal/energyloan
	5. Visalia Unified School District (VUSD) Solar Program: Through various funding sources, the VUSD has installed and will continue to implement renewable energy opportunities at school facilities.	Visalia Unified School District (VUSD)	Short-term	-Proposition 39 Funding http://www.cde.ca.gov/fg/aa/ca/prop39cceja.asp
Waste & Resource Conservation	6. Water Efficient Landscaping Policy: Continue working to reduce the amount of water used for landscaping through the development of a local Water Efficient Landscape Ordnance, updates to the Landscape Standards, and enforcement of the Water Conservation Ordinance.	City - Natural Resource Conservation Staff	Medium-term	- Community: Cal Water Rebates (Residential and Commercial) (https://www.calwater.com/conservation/rebates_residential.php and https://www.calwater.com/conservation/rebates_commercial.php) - City: California Department of Water Resources. Prop 50 Water Use Efficiency Grant (http://www.water.ca.gov/wateruseefficiency/finance/)
	7. Water Efficient Landscaping Promotion and Education: Educate the community on the benefits of using low-maintenance landscaping.	Community / City - Natural Resource Conservation Staff	Medium-term	- City: The City will continue to pursue opportunities to secure funding for programs that will promote the low maintenance and water efficiency landscaping (e.g. rebate program, lawn make-over giveaway) - SCE's Community Grants (http://www.edison.com/community/)
Transportation / Land Use	8. Transit Oriented Development: Investigate and integrate transit oriented development into all of the City's relevant long-term planning goals and projects when applicable.	City - Planning Staff	Long-term	- California's Strategic Growth Council's Sustainable Communities Planning Grant and Incentive Program (http://www.sgc.ca.gov/planning_grants.html)

	9. Plug-in Electric Vehicle (PEV) Charging Stations: Continue working to expand the deployment of PEV through the development of infrastructure, including the installation of two PEV charging stations each at the Transit parking lot and the two public parking structures.	City - Natural Resource Conservation Staff / Engineering Staff / Public Works Staff	Short-term / Medium-term	- 3rd Party Owner: Alternative Fuel Vehicle Refueling Property Tax Credit (http://www.nissanusa.com/ev/media/pdf/incentives/nissan-leaf-incentive-federal-1.pdf) - Grant with San Joaquin Valley Plug-In Electric Vehicle Coordinating Council (http://energycenter.org/index.php/outreach-a-education/plug-in-a-get-ready/sjv-pevcc) -San Joaquin Valley Air Pollution Control District Public Benefit Grant Program http://valleyair.org/grants/publicbenefit.htm
	10. Local, Low-Carbon Transportation Education: Educate citizens on options for utilizing local, low-carbon transportation.	City - Natural Resource Conservation / Transit Staff	Long-term	- City: The City will continue to pursue opportunities to secure funding for programs that will promote local, low-carbon transportation education.
	11. Infill and Higher Density Development: Through the 2030 General Plan Update and other tools, the City will continue to promote infill development.	City – Community Development Staff	Short-term / Medium-term / Long-term	- California's Strategic Growth Council's Sustainable Communities Planning Grant and Incentive Program (http://www.sgc.ca.gov/planning_grants.html)
	12. CNG Public Fueling Stations: The City will continue to remove barriers to the installation of public CNG fueling stations, and work with community stakeholders to advance the utilization of CNG as a cleaner alternate fuel source.	Community / City Transit Staff	Medium-term	- 3rd Party Owner: Alternative Fuel Vehicle Refueling Property Tax Credit (http://www.nissanusa.com/ev/media/pdf/incentives/nissan-leaf-incentive-federal-1.pdf) - California Air Resources Board's Low Carbon Fuel Standard Program http://www.arb.ca.gov/fuels/lcfs/lcfs.htm
	13. Anaerobic Digestion	Public Works Staff	Long-term	-The City will seek opportunities to utilize anaerobic digestion as a solution for waste management.

The two tables above provide a snapshot of select proposed GHG emissions reduction measures and potential sources for funding/financing the proposed measures for Visalia's community. Additional details for each measure are below.

Energy Systems

1. ENERGY STAR Appliances & Equipment: Promote purchasing of energy efficient home and office appliances and equipment (e.g. ENERGY STAR)

   ENERGY STAR is a partnership between the U.S. Environmental Protection Agency (EPA), U.S. Department of Energy (DOE), and industry to voluntarily label products that meet certain energy efficiency criteria. ENERGY STAR products include home electronic appliances, office equipment, and light fixtures and bulbs. ENERGY STAR also certifies buildings for energy efficiency and provides energy management strategies for business and government agencies.[53]

   According to the EPA, more than 2 billion ENERGY STAR-certified products have been purchased since 1992, generating utility bill savings of $14 billion in 2006, the equivalent to the generation capacity of 70 power plants. These energy savings translate to a GHG emissions reduction of 37 million metric tons, equal to removing 25 million vehicles off the road.[54]

   Based on the survey analysis, emissions reduction was quantified for the following appliances & equipment:

   - Residential Sector
     - Window air conditioners
     - Refrigerators
     - Clothes washers
     - Dishwashers
   - Commercial/Industrial Sector
     - Computers
     - Monitors
     - Copiers
     - Printers

   Implementation Scenario:
   The City of Visalia can implement numerous programs to promote the use of ENERGY STAR appliances and equipment throughout the community. The City will continue to explore opportunities with the VIEW partnership to identify education/outreach programs, and work with SCE to advertise the availability of energy efficiency equipment rebates. As part of a larger climate change/sustainable education campaign for the community, the City can promote the purchase and use of ENERGY STAR appliances & equipment.

   Co-Benefits:[55]
   - ENERGY STAR computers use 20-60% less energy than other computers.

[53] Source: ICLEI CAPPA.
[54] Ibid.
[55] Source: ICLEI CAPPA

- The lifecycle energy savings of an energy efficient vending machine can accrue to more than $1,500 over a typical 14-year contract.
- Energy efficient dishwashers consume less water as well as less energy. As part of a water conservation program, efficient dishwashers can help reduce the amount water used and graywater needed to be treated.
- The office water cooler can use more electricity than a full-size refrigerator. An ENERGY STAR water cooler reduces this energy use by 50%. An ENERGY STAR hot and cold water cooler can save $47 a year in energy, and a cold cooler can save $12 a year (coolers that produce both hot and cold water use more energy and offer more potential for savings).
- Copiers consume more energy than other types of office equipment because they operate around the clock. ENERGY STAR copiers are 25% more energy efficient than conventional imaging equipment and help to save paper with double-sided printing. ENERGY STAR copiers run cooler, saving energy on air conditioning and require less maintenance.
- Replacing a conventional printer with an ENERGY STAR qualified one can reduce CO2 emissions by 1,147 pounds over a 5-year life, the equivalent of removing 0.15 cars from the road for a year.
- New qualified printers are, on average, 37% more energy efficient than conventional ones. They reduce paper consumption by printing double-sided pages and air conditioning costs by running cooler. A new energy efficient printer yields 28% savings in energy and maintenance costs.
- An efficient and properly sized air conditioning unit can increase comfort. An oversized unit will both waste energy and leave too much humidity in the air, reducing comfort.
- ENERGY STAR air conditioners use about 10% less energy than new non-ENERGY STAR units.
- Next to air conditioning, refrigerators are usually the single biggest electricity user in a home. This may also be true at the workplace. ENERGY STAR refrigerators use half as much energy as refrigerators made before 1993, 40% less than refrigerators made in 2001, and 15% less than required by federal regulation in 2007.

Additional Resources:

1) ENERGY STAR
   http://www.energystar.gov/
2) Consortium for Energy Efficiency
   http://www.cee1.org/resid/seha/dishw/dishw-main.php3

2. Community-wide Solar PV Bulk Purchasing: Continue to promote community-wide rooftop solar. Continue exploring the potential to collaborate with regional partners on a community-wide solar bulk purchase program.

   In a National Renewable Energy Laboratory (NREL) report,[56] community solar is defined as a solar-electric system that, through a voluntary program, provides power and/or financial benefit to, or is owned by, multiple community members. A growing branch of community solar development is "bulk purchasing," which has three participating community parties: a collection of property owners, an aggregating agent, and a solar contractor. Community solar

[56] NREL: A Guide to Community Solar: http://www.nrel.gov/docs/fy11osti/49930.pdf

aggregation has been successfully performed by local governments (e.g. City of Portland) and private firms (e.g. One Block Off the Grid). Some off the project components undertaken include the following bulk equipment purchasing and permit and incentive paperwork. In turn, this allows participating customers to realize a discount in their system purchase price through the following:

- Volume discounts from bulk purchasing
- No marketing or non-core costs to contractor
- The group of installations is put up for competitive bidding

Some major market barriers identified by the City of Portland include: high upfront cost, technical and procedural complexity, and customer inertia. Some recommendations for success include: competitive contractor selection, community-led outreach and education, and a limited-time offering.

Implementation Scenario:

The City will continue working with the San Joaquin Valley Clean Energy Organization (SJVCEO) to explore the potential to establish a regional solar bulk purchase program. A regional bulk purchase program provides the opportunity to minimize the administration burden while achieving the most substantial impact. The City and SJVCEO will work collaboratively to identify potential funding and project partners.

Co-Benefits

- Homeowner solar education events will strengthen community bonds.
- Children and young adults may change their perspective on renewable energy and the environment by observing collective efforts.
- Local contractors can gauge interest in solar installations, seek additional training, and offer installation services to non-participating homeowners
- Schools and libraries can build educational modules around the program on topics of energy, conservation, and economics.

Additional Resources:

- The City of Portland Solarize Guidebook
  http://www.nrel.gov/docs/fy12osti/54738.pdf
- Database of State Incentives for Renewable & Efficiency
  http://www.dsireusa.org

3. Property Assessed Clean Energy (PACE) Program: Work to establish PACE financing which supports energy efficiency and renewable energy projects by providing up-front capital that is subsequently paid back through a special assessment on participants' property taxes.

   Implementation Scenario: The City Council has approved participation in the CaliforniaFIRST PACE program and the County of Tulare, which is required for Visalia to participate, has also approved participation. The CaliforniaFIRST program is currently completing the verification studies and reports required to participate in the program. Staff anticipate the PACE program will be available in Visalia in early 2014. The program will be structured to maximize the available SCE and SoCalGas energy efficiency incentives. With over 29 million square feet of commercial space in the City, there is tremendous opportunity to assist local homeowners and businesses to install energy efficiency retrofits.

Co-Benefits:

- Investment in capital improvements serves as an economic catalyst, including job creation opportunities and improved property tax base.
- Energy efficient buildings are more cost effective to operate, and provide additional financial stability for the owner/operator.
- Providing financing on the property tax roll incentivizes property owners who may sell in the next 3-5 years, as the debt repayment obligation transfers with the property sale.
- Improvements often include other types of resource conservation, such as water efficient fixtures.
- Property owners participating in PACE often enjoy the following program benefits:
    - Longer payback period (up to 20 years)
    - Property qualified financing; not credit-based
    - Flexible and negotiated financing transaction

Additional Resources:

- AB811
  http://www.energy.ca.gov/recovery/documents/ab_811_bill_20080721_chaptered.pdf
- CaliforniaFIRST:
  https://californiafirst.org/overview
- Southern California Edison Incentives
  www.sce.com

4. Energy Efficiency Marketing & Programs: Continue co-branding programs with the VIEW, SCE and SoCalGas through Public Goods Funds, facility benchmarking through AB1103, and other energy efficiency program opportunities.

   Implementation Scenario: The City of Visalia is an active member of the Valley Innovative Energy Watch (VIEW), which is a partnership with Southern California Edison (SCE), Southern California Gas Company (SoCalGas), Pacific Gas & Electric (PG&E), SJVCEO and other public jurisdictions in Kings/Tulare Counties. VIEW includes various outreach opportunities for energy efficient programs and services, and the City will continue to be an active participant in local efforts to inform the community about energy efficient opportunities. The City also actively seeks opportunities to implement energy efficient programs funded through the Public Goods Funds, such as the LED light exchange, Direct Install, and Home Tune-Up. The Natural Resource Conservation Division will continue working to identify opportunities within the community to reduce kWh consumption through public/private partnerships, including providing public education on the need for energy efficiency, emissions reduction programs, and cost savings associated with energy-efficient buildings.

   Co-Benefits:
   - Energy efficient buildings are more cost effective to operate, and provide additional financial stability for the owner/operator.
   - AB1103 allows the buyer to make an informed decision regarding the energy efficiency of the buildings they are considering for purchase.
   - Leveraging resources with the VIEW and other community partnerships will result in

better outcomes and more efficient market saturation.

Additional Resources:

- Valley Innovative Energy Watch (VIEW)
  http://www.viewthesavings.com/
- Nonresidential Building Energy Use Disclosure Program (AB 1103)
  http://www.energy.ca.gov/ab1103/
- Central Valley Home Energy Tune-Up
  https://www.cvetu.com/home-energy-tune-up

5. Visalia Unified School District (VUSD) Solar Program: Through various funding sources, the VUSD has installed and will continue to implement renewable energy opportunities at school facilities.

   Implementation Scenario: The Visalia Unified School District (VUSD) recently completed the installation of solar to generate approximately 3,298,015 kWh annually at 13 school facilities. The Visalia Unified School District is a K-12 public school system that serves the city of Visalia. The District covers approximately 214-square miles, and has a student population over 32,000. Nestled close to the majestic Sierra Mountains in the heart of California's San Joaquin Valley, the Visalia Unified School District is committed to providing students young and old with the tools and skills necessary to succeed in life. The project was funded through the proceeds of General Obligation Bonds, issued by Visalia USD, in combination with public lease financing. VUSD will have additional opportunities to install renewable energy facilities through the proposition 39 funding and potentially through Cap-and-Trade proceeds. It is anticipated that the VUSD will install a Phase 2 of solar projects.

   Co-Benefits:

   - Children and young adults may change their perspective on renewable energy and the environment by observing renewable energy installations at schools.
   - Schools and libraries can build educational modules around the program on topics of energy, conservation, and economics.

   Additional Resources:

   - The California Clean Energy Jobs Act (Proposition 39)
     http://www.energy.ca.gov/efficiency/proposition39/
   - California Energy Commission (CEC) Energy Efficiency Financing
     http://www.energy.ca.gov/efficiency/financing/

Waste and Resource Conservation

6. Water Efficient Landscaping Policy: Continue working to reduce the amount of water used for landscaping through the development of a local Water Efficient Landscape Ordnance, updates to the Landscape Standards, and enforcement of the Water Conservation Ordinance.

   The City has two relevant ordinances in place, Water Efficient Landscape Ordinance (adopted from state model on January 2, 2010) and Water Conservation Ordinance, which have resulted in per capita demand trending down recently. The California Water Service Company (Cal

Water), which provides water services to Visalia, is subject to The Water Conservation Act of 2009 (California Senate Bill X7-7) per capita water reduction target of 20% by December 21, 2020. Combined with Cal Water's water meter conversion program and the City's policies for water conservation measures, Cal Water should be able to achieve its mandated reduction target goal. However, the City should continue to be aggressive in its water conservation measures and work closely with its citizens and other relevant entities to ensure that the community stays active in water conservation. Based on research that outdoor water use makes up about 54% of water use in the residential sector in the Tulare Lake Hydrologic Region[57], there seems to be significant opportunities for water conservation, specifically through water efficient landscaping. Additionally, since urban water supplies require energy to transport, treat, and distribute, reducing water use will also result in electricity savings. For instance, in Northern California, saving 10,000 gallons of water will reduce 54 kWh of indoor use and 35 kWh for outdoor use. In Southern California, which brings water from hundreds of miles away, conserving 10,000 gallons of water can reduce 130 kWh for indoor use and 111 kWh for outdoor use.[58]

Implementation Scenario:
The ultimate means at the City's disposal with which to reduce water usage from landscaping is to periodically revisit the Landscape and Water Conservation Ordinances and tailor them to changing times and circumstances and to ensure that they continue to be aggressive yet achievable. As with any resource management legislative effort, the City should continue to collaborate with water users in this effort including homeowners, California-licensed landscape architects, and operators of large landscape installations like schools, hospitals, and golf courses.

In addition to asserting the leadership role that Visalia plays in water conservation policies, another important element of increasing impact is to take advantage of technology. With respect to the Water Conservation Ordinance there are three elements that need to be very easily accessed by citizens for enhanced compliance. They are:

1. Current water conservation stage
2. Guidelines corresponding to the stage including watering schedules, when in effect.
3. Means to report violations to appropriate city authority.

Co-Benefits:

- Once established, landscaping with native plants is less expensive to maintain than lawns. Natural landscaping provides habitat for wildlife. The high levels of pesticides and fertilizers used on lawns are also avoided.
- Water efficient landscaping can help to reduce the use of lawnmowers and other yard equipment like leaf blowers, which are much more polluting than automobiles. One mower, for example, can produce as much pollution in a year as 43 cars.
- When water efficient landscaping is implemented as a part of a broader water conservation program, a significant reduction in water use can be achieved. Water pumping, purification, and wastewater treatment can represent a large portion of municipal energy use.

[57] Source: Outdoor Residential Water Use, Appendix B, Table B-2: Estimating Outdoor Water Use: Hydrologic Region Method. Based on Tulare Lake Hydrologic Region. http://www.pacinst.org/reports/urban_usage/appendix_b.pdf.
[58] Source: ICLEI CAPPA.

- Resultant publications of aesthetic or efficient landscapes may bring in tourism.
- There are opportunities to setup community or demonstrations gardens on schools, senior centers, and community centers for education on water and local plants.

Additional Resources:

- Visalia Waterwise Gardening
  http://www.visalia.watersavingplants.com/
- Cal Water Landscape guidelines
  http://www.calwater.com/your_district/uwmp/ch/Appendix_F_-_Landscape.pdf

7. Water Efficient Landscaping Promotion and Education: Promote and educate the community on the benefits of using water efficient landscaping.

   The well-groomed green lawns that have become the assumed default landscape throughout the United States are aesthetically pleasing, but they come with a number of environmental costs. An average acre of lawn in the Unites States can use 653,000 gallons of water each year.[59] In addition to implementing policies and regulations, another effective way to encourage Visalia's community to conserve water through water efficiency landscaping is through promotion and education.

   Implementation Scenario:
   One measure that can be taken to increase awareness with landscaping conservation efforts is friendly competition. There are many print and electronic publications that evaluate and reward landscaping, such as Sunset Magazine and Better Homes and Gardens. The City of Visalia can reach out to these publications, including ones with specific awards for conservation themes like water usage, native plant species, and advanced irrigation technologies, and encourage local participation or even host their own. This could tie into County and State Fairs and social media.

   Co-Benefits: [60]

   - Once established, landscaping with native plants is less expensive to maintain than lawns. Natural landscaping provides habitat for wildlife. The high levels of pesticides and fertilizers used on lawns are also avoided.
   - Water efficient landscaping can help to reduce the use of lawnmowers and other yard equipment like leaf blowers, which are much more polluting than automobiles. One mower, for example, can produce as much pollution in a year as 43 cars.
   - When water efficient landscaping is implemented as a part of a broader water conservation program, a significant reduction in water use can be achieved. Water pumping, purification, and wastewater treatment can represent a large portion of municipal energy use.
   - Resultant publications of aesthetic or efficient landscapes may bring in tourism.
   - There are opportunities to setup community or demonstrations gardens on schools, senior centers, and community centers for education on water and local plants.

[59] Source: ICLEI CAPPA.
[60] Source: ICLEI CAPPA.

Additional Resources:

- US EPA Beneficial Landscaping
  http://www.epa.gov/greenkit/landscap.htm
- Natural Landscaping for Public Officials
  http://www.cleanaircounts.org/Resource%20Package/A%20Book/landscaping/Greenacres/HNLPO/NLPOcont.htm

Transportation/Land Use

8. Transit-Oriented Development: Investigate and integrate transit oriented development into all of the City's relevant long-term planning goals and projects when applicable

   High-density neighborhoods with good rail or bus transit, mixed residential and commercial uses, and pedestrian-friendly design have much lower rates of car use than typical low-density suburban developments. Transit oriented development (TOD) attempts to create such neighborhoods in planning of new or existing transit systems.

   Ease of access to transit is attractive to many residents and businesses, but for higher-density developments to be built around transit stations, land use regulations must frequently be changed to allow and encourage them. Parking requirements, density and height limitations, and single-use zoning in many locations make TOD impossible. Planners often grant developers density bonuses to encourage projects, or in exchange for contribution to open space funds or affordable housing inclusion. Providing retail space and childcare within residential developments allows residents to meet more of their needs within walking distance. Attention to making transit stations accessible by pedestrians and providing bicycle parking will encourage people to walk or bike to transit rather than driving. The high capital investment of rail systems gives developers confidence that transit will be there a long time, but TOD has also been developed around bus stations, park-and-ride facilities, and Bus Rapid Transit routes.[61]

   Implementation Scenario:
   TOD is a long-term measure and, therefore, should be integrated into mechanisms that address long-term response goals and set direction for community development. A good example would be the City's General Plan, the foundation for the future development of the municipality. Understanding this importance, the City is working to integrate TOD into its current General Plan Update (expected to be completed end of 2013). Additionally, the City can work with other cities to encourage patterns of commercial development that support use of public transit, including modifying development regulations to facilitate commercial and/or mixed use projects at sites near transit stops. Moreover, another potential strategy is to provide incentives for new development and renovation of existing uses in identified infill areas, if they have not already been done so (e.g. density bonus, flexible parking requirements, tax incentives, etc.).

   Other local governments have adopted other various implementation strategies. For example, King County, WA has developed transit-oriented housing and retail projects at existing park-and-ride facilities. Residents receive free or reduced price bus passes.[62] TOD was planned along with the Portland, OR Westside light rail line. 3,600 new housing units were built within one-

[61] Source: ICLEI CAPPA.

[62] For more information, see: www.metrokc.gov/kcdot/tod/.

half mile of stations by the time transit service began in 1998, and 3,400 more were in progress.[63]

Co-Benefits:

- Communities built with TOD principles have better economic health, lower vacancy rates, and higher property values, as well as higher rates of walking and transit use and lower rates of driving.
- Lower vehicle miles traveled reduces priority pollutant emissions that contribute to ozone and particulate matter air pollution.

Additional Resources:

- American Public Transportation Association
  http://www.apta.com/research/info/briefings/briefing_8.cfm
- Victoria Transport Policy Institute
  http://www.vtpi.org/tdm/tdm45.htm

9. Plug-in Electric Vehicle (PEV) Charging Stations: Continue working to expand the deployment of PEV through the development of infrastructure, including the installation of two PEV charging stations each at the Transit parking lot and the two public parking structures.

   Plug-in electric vehicles (PEV) require regular charging to replace a gasoline engine and therefore there are no tailpipe emissions. Most EVs can go 100-200 miles between charges. Charging stations are integral to realizing the environmental benefits of electric vehicle technology. The most commonly cited factor for resistance to PEV adoption is range anxiety and an accessible charging station is the remedy. An intelligently distributed network of PEV charging stations is required to meet increasing public and private need for electric transportation fuel.

   Implementation Scenario:
   The City of Visalia can implement the development of a PEV charging station network in phases. There are three components to such a network: in-home units for private PEV owners, charging stations in private parking lots, and charging stations in public spaces. Each of these components can be independently supported or incentivized by the city. Currently, the City is working with the San Joaquin Valley Plug-In Electric Vehicle Coordinating Council to explore a grant application for PEV charge stations. The City's initial goal is to install a total of six PEV charging stations (two stations each at the Transit parking structure and the two public parking structures). By staggering the charging station rollout, public and private installations can take advantage of utility, state, and federal incentive programs, as well as, spread out city costs over a longer period of time.

   Additionally, a PEV charging station network can bring economic benefit to the City of Visalia. As there exists federal and private efforts to provide PEV drivers with web-enabled tools providing the locations and real-time availability of charging stations, any stations within the city will be effectively publicized at no cost. Due to the 30 minutes to four hours required to recharge a PEV battery, there will be ample time for tourists to do business with local merchants. Further, the charging fees collected will provide revenue to their public or private

[63] For more information, see: www.todadvocate.com/pdxcasestudy.htm

owners. The fee structure can be remotely programmed for city events or other PEV promotions.

A phase of implementation that can be investigated later in the future, and would turn the Visalia PEV community carbon-free, is covering the parking garages with PEV charging stations with solar PV to generate the charging fuel.

Co-Benefits:

- Driving on electricity is cheaper than driving on gasoline, roughly equivalent to $1/gallon[64]
- In California, the carbon intensity of electricity is 57% lower than gasoline.[65]
- Generate revenue from charging fees, depending on rate configuration.
- EVs have a lower operating cost than gasoline vehicles. Key issues related to battery life still remain, but maintenance and fuel savings costs are expected to outweigh the price of battery replacement.

Additional Resources:

- Fuel Economy.Gov – EV
  http://www.fueleconomy.gov/feg/evtech.shtml
- Southern California Edison – Champion Cities Program
  https://www.sce.com/wps/portal/home/partners/partnerships/pev-cities
- San Joaquin Valley Clean Cities Coalition
  http://www.afdc.energy.gov/cleancities/coalition/san-joaquin

10. Local, low-carbon transportation education: Educate citizens on options for utilizing local, low-carbon transportation.

    The City of Visalia has taken significant steps to offer and support low-carbon transportation options to its citizens. The City can increase the impact of low-carbon transportation options by building awareness and educating the community on the multi-layer benefits of utilizing local, low-carbon transportation measures. Successful marketing efforts involve a two-way flow of information – finding out what people want in transit and what information will help them use it.

    Implementation Scenario:
    In addition to the customary meeting venues to host an educational campaign, the City of Visalia may consider making greater use of technology and media to inform the citizens about low-carbon transportation options. The web-enabled GPS tracking can system used by Visalia Transit can be an instrumental tool in encouraging the use of public transit because it is savvy, addresses the number-one rider complaint[66] (on-time performance), and is accessed through an interface most citizens use daily – the Internet.

    The Riders Reward Monthly Pass system can, its own right, play a major role in educating citizens on transit options. In coordination with the overall transportation education efforts, a push can be made to sign up more participants and seek more lucrative user bonuses. This can

[64] For additional info: http://www1.eere.energy.gov/vehiclesandfuels/electric_vehicles/ev_basics.html
[65] For additional info: http://www.arb.ca.gov/regact/2009/lcfs09/lcfscombofinal.pdf
[66] Ibid.

be achieved be having available more locations in the community, specifically local businesses (e.g. convenient and grocery stores) that offer Pass services (e.g. buying and reloading). Not only will this bring in additional customers into local businesses, the increased convenience of Pass services throughout the community may incentivize additional community members to utilize Visalia's public transit system.

In a case study of successful transportation education programs implemented by other cities in the country, the City of Portland's Smart Trips program has reduced single-occupant car trips by 8-13% in areas of the city that have been targeted.[67] The Smart Trips program provides a diverse menu of fun activities that its citizens can participate in to help raise awareness of the benefits of taking advantage of "green" modes of transportation. Such activities include toured walks and bike rides of Portland's landmarks and classes that offer bicycle maintenance and teach how to use maps and apps to get around. [68]

Co-Benefits

- Increased adoption of the Riders Reward Monthly Pass will greatly increase traffic to the local merchants that participate in the reward program.
- Many opportunities for co-branding and family engagement.
- Reductions in ozone and particulate matter air pollution will have positive impacts on public health.

Additional Resources:

- Natural Gas Vehicle Emissions
  http://www.afdc.energy.gov/vehicles/natural_gas_emissions.html

11. Infill and Higher Density Development: Through the 2030 General Plan Update and other tools, the City will continue to promote infill and higher density development.

Implementation Scenario: The City of Visalia is in the final stages of preparing the 2030 General Plan Update (GPU), which includes a variety of policies focused on promoting infill and higher density development. The GPU includes the establishment of an Infill Incentive Program, which provides incentives for infill development in various priority areas of the City. The program provides Transportation Impact Fee reduction and a 20% density bonus above base zoning. In addition, there are various policies that promote high density development, including following the recommended density in the Regional Blueprint. A complete list of GPU measures can be found in Appendix D.2.

Co-Benefits:

- Increased ridership on public transportation through infill development in close proximity to transit infrastructure.
- Reduced vehicle miles traveled due to infill development near core services and employment opportunities.
- Improved air quality.

Additional Resources:

[67] ICLEI CAPPA.
[68] Source: http://www.portlandoregon.gov/transportation/54616

- Visalia 2030 General Plan Update
  http://www.visaliageneralplanupdate.com/project.html

12. CNG Public Fueling Stations: The City will continue to remove barriers to the installation of public CNG fueling stations, and work with community stakeholders to advance the utilization of CNG as a cleaner alternate fuel source.

    Implementation Scenario: The City will continue working with local partners to expand the opportunity for the installation of public CNG fueling stations. This will be accomplished through community collaboration with other CNG providers, such as the Visalia Unified School District (VUSD).

    Co-Benefits:
    - Improved air quality;
    - Increased access to alternate fuel sources;
    - Increased financial stability.

    Additional Resources:
    - California NGV Coalition
      http://www.cngvc.org/news-and-resources/fueling-stations.php

    - Natural Gas Fueling Station Locations
      http://www.afdc.energy.gov/fuels/natural_gas_locations.html

13. Anaerobic Digestion: Commercial compost will be processed through anaerobic digesters by 2015 and all other green waste and food scraps will be processed by anaerobic digesters by 2018.

    Implementation Scenario: The City currently contracts with two companies for green waste and residential/commercial compost disposal. It is anticipated that one of the providers will install an anaerobic digester in 2014, and it is anticipated that 100% of the green waste collected will go to an anaerobic digester by 2018. The City is currently exploring the opportunity to maximize operations to improve efficiency, reduce VMT and provide more cost effective waste collection services. This analysis could result in the installation of sub-stations and/or the development of a City-owned anaerobic digestion facility. It is assumed that half of the volume will be converted to natural gas for fueling and the remaining volume will be converted to electricity.

    Co-Benefits:

    - Anaerobic digestion provides the opportunity to generate bio-gas which can be used as fuel, or the bi-products can be converted to electricity.
    - The City can expand the types of materials that are eligible for composting through access to anaerobic digestion.

    Additional Resources:

    - California Energy Commission

http://www.energy.ca.gov/biomass/anaerobic.html
- American Biogas Council
http://www.americanbiogascouncil.org/biogas_what.asp

For a list of other optional measures that could be implemented in the future to reduce emissions in the community, please see Appendix E.3.

Proposed Municipal Measures

The City of Visalia has developed a series of proposed mitigation measures to help achieve the reduction goals established for 2020 and 2030. Table 41 provides a summary of proposed municipal measures.

Table 41: Summary of Visalia's Proposed Municipal Measures Impact

Action Category	Proposed Actions	2020 Electricity Use Reduction (kWh)	2020 Gasoline Use Reduction (gallons)	2020 Cost Savings	2020 Potential CO2e Emissions Reduction (metric tons)	2030 Potential CO2e Emissions Reduction (metric tons)
Energy	1. **ENERGY STAR Appliances & Equipment:** Modify/Implement purchasing policies or practices to specify energy efficient standards (e.g. ENERGY STAR) for relevant municipal office appliances & equipment.					
	a. Computers	18,291	-	$2,744	5	5
	b. Vending Machines	11,613	-	$1,742	3	4
	c. Refrigerators	13,920	-	$2,088	4	5
	2. **SCE-Owned Streetlight Retrofit**: Continue to explore the potential to purchase and retrofit the Southern California Edison owned streetlights.	956,393	-	$334,737	275	356
	3. **Solar Photovoltaic (PV):** Investigate and install additional renewable energy systems (e.g. solar PV) on municipal facilities where appropriate.	-	-	-	586	1,431
Transportation	4. **Procurement of Smaller/High Fuel Efficiency Vehicles:** Update the procurement policy and practices to specify smaller/high fuel efficiency for each municipal vehicle class.	-	2,471	$10,129	22	28
TOTAL		**1,000,217**	**2,471**	**$351,440**	**896**	**1,828**

Table 42: Summary of Visalia's Proposed Municipal Measures Implementation Plan

Action Category	New Actions	Responsible Implementer(s)	Timeframe for Implementation	Potential Funding and Financing Options
Energy	1. ENERGY STAR Appliances & Equipment: Modify/Implement purchasing policies or practices to specify energy efficient standards (e.g. ENERGY STAR) for relevant municipal office appliances and equipment.	Procurement staff	Short-term	- No/limited funding needed because there is little/no price difference between ENERGY STAR and conventional equipment.
	2. SCE-Owned Streetlight Retrofit: Continue to explore the potential to purchase and retrofit the Southern California Edison owned streetlights.	Public Works Staff / NRC Staff	Short-term / Medium-term	- California Energy Commission's Energy Efficiency Financing - low interest loan for energy efficiency and renewable energy projects (www.energy.ca.gov/efficiency/financing) - Municipal Revolving Loan/Investment Program (http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/revolvingloanfunds.html)
	3. Solar Photovoltaic (PV): Investigate and install additional renewable energy systems (e.g. solar PV) on municipal facilities where appropriate.	NRC Staff	Short-term / Medium-term	- 30% Federal tax credit (U.S Treasury Department-sponsored Investment Tax Credit) - California Solar Initiative's PV Incentives (state rebate program) - 3rd party financing with solar power purchase agreements (PPA) - Solar lease - California Energy Commission's Energy Efficiency Financing - low interest loan for energy efficiency and renewable energy projects For additional information: http://www.dsireusa.org/solar/incentives/incentive.cfm?Incentive_Code=CA134F&re=1&ee=1 http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA134F&re=1&ee=1 http://www.epa.gov/greenpower/buygp/solarpower.htm www.energy.ca.gov/efficiency/financing
Transportation	4. Procurement of Smaller/High Fuel Efficiency Vehicles: Update the procurement policy and practices to specify smaller/high fuel efficiency for each municipal vehicle class.	Procurement Staff / Municipal Fleet Staff	Short-term / Medium-term	- No/limited funding needed

The two tables above provide a snapshot of select proposed GHG emissions reduction measures and potential sources for funding/financing the proposed measures for Visalia's municipal sector. Additional details for each measure are below.

Energy

1. ENERGY STAR Appliances & Equipment: Modify/Implement purchasing policies or practices to specify energy efficient standards (e.g. ENERGY STAR) for relevant municipal office appliances and equipment.

   ENERGY STAR is a partnership between the U.S. EPA, U.S. DOE, and industry to voluntarily label products that meet certain energy efficiency criteria. ENERGY STAR products include home electronic appliances, office equipment, and light fixtures and bulbs. ENERGY STAR also certifies buildings for energy efficiency and provides energy management strategies for business and government agencies.[69]

   According to the EPA, more than 2 billion ENERGY STAR-certified products have been purchased since 1992, generating utility bill savings of $14 billion in 2006, the equivalent to the generation capacity of 70 power plants. These energy savings translate to a GHG emissions reduction of 37 million metric tons, equal to removing 25 million vehicles off the road.[70]

   Based on the survey analysis, the emissions reductions were quantified for the following appliances and equipment in city facilities:

   - Computers
   - Copiers
   - Printers
   - Refrigerators
   - Vending machines

   Implementation Scenario:
   The City can undertake diverse programs to encourage the purchase and use of ENERGY STAR and other energy efficient equipment and appliances in City facilities. For instance, as contracts with vendor operators come up for renewal, the City can negotiate new contracts that include more energy efficient machines that will reduce GHG emissions and cost less to operate. Since 1998, the City of Los Angeles has had an ENERGY STAR office equipment procurement policy, saving more than 6,000,000 kWh of energy and 6,000 tons of CO2 annually.[71] Albany, CA has adopted a policy mandating that all appliances used in municipal buildings meet ENERGY STAR standards.[72]

   Additionally, the City can "piggy-back" on already existing California State contracts. The California State Department of General Services develops and administers contracts for goods and services that promote "green" products and services. A list of products with environmental attributes that are available to local governmental agencies in California can be found on the

[69] Source: ICLEI CAPPA.
[70] Ibid.
[71] For more information, see: http://www.lacity.org/ead/environmentla/.
[72] For more information, see:www.albanyca.org.

Department's website.[73] Although these contracts are developed and used by state agencies, California local governments have access to them as well. "Piggy-backing" onto the State's procurement process can be extremely beneficial not only in helping local governments purchase "green" products and services, it can help reduce the time and resources that are required to develop specifications of products and services with environmental attributes and to identify and select the appropriate bidder(s) during the solicitation process. Additionally, given that bulk purchasing is usually less costly, utilizing state contracts is a cost-effective method for local governments to purchase products and services.

Co-Benefits:

- Please see "Co-Benefits" of ENERGY STAR appliances and equipment under Community Proposed Measures above.

Additional Resources:

- ENERGY STAR - http://www.energystar.gov/
- Consortium for Energy Efficiency - http://www.cee1.org/resid/seha/dishw/dishw-main.php3
- U.S. EPA's Environmentally Preferable Purchasing - http://www.epa.gov/oppt/epp/
- California State Department of General Services - http://www.green.ca.gov/EPP/Sources/products.htm

2. SCE-owned Streetlight Retrofit: Continue to explore the potential to purchase and retrofit the Southern California Edison owned streetlights.

As of early 2013, the City operates a total of 6,877 streetlights, of which 6,157 (90%) are SCE-owned streetlights. The City is in the process of evaluating the feasibility of purchasing SCE streetlights and switching out the sodium light bulbs for potentially LED lighting technology in the streetlights, which could lead to significant energy savings. Based on the fact that SCE-owned streetlights have a higher rate structure than City-owned streetlights ($0.35/kWh versus $0.093/kWh), conversion of SCE-owned streetlights to City-owned streetlight will also provide cost savings to City operations.

Implementation Scenario:
AB 719, which may require California's investment owned utilities to replace outdated streetlights with energy efficient replacements, is currently being considered by the State legislature. The City is keeping close track of the progress of this legislature, as it will have a direct impact on its streetlight operations.

Co-Benefits:

- Potential reduction in electricity cost from streetlight operations.

Additional Resources:

1) AB 719 proposed bill http://www.leginfo.ca.gov/pub/13-14/bill/asm/ab_0701-0750/ab_719_cfa_20130405_164252_asm_comm.html
2) AB 719 progress

[73] For more information, see: http://www.green.ca.gov/EPP/Sources/products.htm and http://www.pd.dgs.ca.gov/contracts/recycled

http://openstates.org/ca/bills/20132014/AB719/

3. Solar Photovoltaic (PV): Investigate and install additional renewable energy systems (e.g. solar PV) on municipal facilities where appropriate.

   The City has already taken steps to deploy solar PV in its facilities. For instance, the City has installed a 30 kW solar PV system at the Visalia Airport, small solar PV systems (cumulative solar capacity of 40 W) on all its new bus shelters, and two 5 kW PV systems in its Transit Center. The City will be upgrading the Water Conservation Plant in the near future to include the installation of a 1 MW solar PV system. Given the benefits of solar and the reduction in cost that is expected to continue, the City should continue to explore and investigate additional PV installations on its facilities. In this measure, it is assumed that the City will install another 30 kW of solar PV on its facilities by 2020. In 2013, the City adopted the Visalia Solar Strategy, which identifies financially feasible solar at five City-owned facilities. The strategy includes implementation of solar in multiple phases, and established a priority for financially feasible renewable energy sources.

   Implementation Scenario:
   There are currently a number of ways for City to finance solar PV systems on its facilities. This includes, but are not limited to the following mechanisms:

   - Direct purchase – The City provides the up-front cost for the purchase and installation of the solar PV system.
   - Lease – Instead of an up-front direct purchase, the City pays a 3rd party an agreed upon fixed amount every month for the solar system.
   - Power Purchase Agreement – The City enters into a contract with a 3rd party to purchase all electricity generated by the solar system. The City pays a fixed rate for the electricity the system produces and only pays for the electricity that the installed system produces each month. The 3rd party owns the solar system and is fully responsible for all ownership cost.

   A maintenance program for the solar PV panels should also be considered to ensure that the solar panels are operating at optimum efficiency. The PV panels should be monitored intermittently to ensure functionality as well as other maintenance including cleaning the panels for unobstructed light intake.

   Co-Benefits:
   3) In addition to reducing emissions, installation of additional solar PV on municipal facilities will result in reduction in electricity use and cost savings on the City's utility bills.

   Additional Resources:
   - U.S. Treasury Department Investment Tax Credit http://www.dsireusa.org/solar/incentives/incentive.cfm?Incentive_Code=CA134F&re=1&ee=1
   - California Solar Initiative's PV Incentives http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA134F&re=1&ee=1

- Solar Power Purchase Agreements
  http://www.epa.gov/greenpower/buygp/solarpower.htm
- California Energy Commission's Energy Efficiency Financing
  www.energy.ca.gov/efficiency/financing

Transportation

4. Procurement of Smaller/Higher Fuel Efficiency Vehicles: Update the procurement policy and practices to specify smaller/high fuel efficiency for each vehicle class.

   Purchasing and using smaller/higher fuel efficiency vehicles is one simple way to improve the efficiency of vehicles. This is especially true if tasks do not require the use of larger vehicles. The smallest vehicle that can accomplish a task will usually be the most efficient.

   Implementation Scenario:
   As evident in the existing municipal measures section, the City of Visalia has already implemented many measures to reduce emissions from its vehicle and transit fleet. To further reduce its fleet emissions, the City should evaluate whether a SUV/light truck/full-size sedan is really needed for specific City operations or whether a compact car can be used to do the same job. Whenever possible, the City should purchase and utilize smaller or higher fuel efficiency vehicles to reduce emissions as well as fuel costs. Similar measures have been adopted by other local governments. For example, Denver's green fleet plan includes a directive to downsize vehicles.[74] Arlington, MA passed a law that vehicles purchased by city departments must be the most fuel efficient that will fulfill the intended function.[75]

   Co-Benefits:
   - In addition to reducing emissions and saving on fuel costs, smaller vehicles usually have a lower purchase price.

   Additional Resources:
   4) U.S. DOE's Alternative Fuels & Advanced Vehicles Data Center
      http://www.afdc.energy.gov/afdc/fleets/index.html
   5) Green Fleet
      http://www.greenfleets.org/

For a list of other measures that can be implemented to reduce emissions in the community, please see Appendix E.3.

[74] For more information, see:http://www.greenfleets.org/Denver.html.
[75] For more information, see:http://www.greenfleets.org/Arlington.html.

4. NEXT STEPS & CONCLUSION

Climate change is an issue of growing concern for communities across the United States and around the world. The City of Visalia has displayed great leadership and foresight in choosing to confront this issue now. By reducing the amount of GHG emitted by its community, the City of Visalia joins hundreds of other U.S. cities in curbing the tide of climate change and the numerous threats associated with it, such as increasingly severe weather events, disrupted agricultural systems and rising sea levels.

In addition to mitigating the destabilization of the climate and associated impacts, the City stands to benefit in many other ways from the proposed measures outlined in this report. Some of these benefits include financial savings resulting from improved energy efficiency, increase in public health benefits, increased energy security, improved air quality and stimulation of the emerging renewable energy sector of the economy.

This Climate Action Plan includes the results of a baseline GHG emissions inventory, identification and analysis of existing and proposed GHG reduction measures, and a reduction target to help Visalia set a goal for climate protection. Recommended next steps to help Visalia successfully meet its reduction target are discussed below.

Adoption of a Final Climate Action Plan
This CAP serves as the launching pad and guideline for helping the City identify emissions sources, set emissions reduction goals specific to Visalia's own objectives, and begin prioritizing strategies to achieve those goals. This typically lengthy process should ideally include participation and buy-in of all affected entities as well as the members of the community, after which, the City can proceed to amend and/or adopt this document as a *final* CAP.

Implement New Measures
The implementation of selected emissions reduction measures must be practical, taking into account the administrative, political, technical, and other issues that the City will face in getting programs up and running. It must allow time for stakeholder involvement in each phase as appropriate. Yet, it should also contain significant near-term steps, pushing Visalia to build from the momentum created through this CAP and the initial measures that have been identified. The City should consider emphasizing progress on low-hanging fruit first, allowing time to lay the groundwork for more complicated projects.

Engage the Public
The process of implementing many of the proposed measures as well as identifying additional measures to adopt in the future will necessitate the involvement of community stakeholders, including the public at large. Exploring opportunities to involve these stakeholders in the development, review and implementation of this CAP to increase community involvement and support is key to the success of Visalia's long-term climate protection.

Monitor and Evaluate Measures Periodically
The City should also establish a system for monitoring the implementation of the selected new measures and adjust the plan as opportunities arise (e.g. availability of new/more accurate data; new resources & tools, funding availability, etc.). In addition to those already discussed in this plan, there are numerous potential measures that the City can undertake to reduce emissions.

Implementation of these new measures may require additional resources. In some cases, they will require the cooperation of other agencies, private businesses, and residents. The new actions are intended to be implemented over time. During that time, it is likely some measures will evolve as circumstances change and new opportunities present themselves. Therefore, the accomplishments and the goals adopted henceforth should be evaluated periodically with necessary adjustments made to ensure that they are still both aggressive and achievable given local circumstances. Additionally, the City should utilize available resources during that time to ensure that Visalia successfully meets its reduction goal.

Integrate Climate Protection Polices into other City Plans
The City should integrate GHG emissions reduction policies and practices into the City's other relevant reports and plans. Of particular importance is the City's General Plan. General plans are vital to the successful growth of communities. Through policies and implementation strategies, general plans lay the foundation for local governments to build upon. It is an appropriate mechanism for establishing long-term response goals and for setting direction for community development. Climate change protection is no exception to this notion. As responsible leaders of the community, the City of Visalia is in an excellent position to lay the foundation for the community by integrating long-term climate protection policies into its General Plan.

Re-Inventory GHG Emissions
As stated previously, re-inventory of the City's GHG emissions on a regular basis (e.g., 3-5 years) is highly recommended. The process of conducting a re-inventory will allow the City to demonstrate progress toward local emissions reduction targets and identify opportunities to integrate new or improved measures into its emissions reduction plan.

APPENDIX A.1. – QUANTIFICATION OF 2005 BASELINE INVENTORY

I. Community GHG Emissions Inventory

Built Environment

Electricity Use

Information for community electricity use was provided by Southern California Edison (SCE) account representative, Mark Okino, mark.okino@sce.com.

Sector	Annual Electricity Use (kWh)
Residential	335,175,220
Commercial/ Industrial	430,417,421
TOTAL	**765,592,641**

Rate Group	Annual Electricity Use (kWh)
Domestic	335,175,220
AG TOU	14,391,886
PA-1	1,636,459
TOU-GS	66,299,206
GS-1	50,270,947
GS-2	167,878,196
TOU-8	124,296,608
Street lighting	4,960,465
TC-1 (Traffic Control)	683,654
TOTAL	**765,592,641**

Natural Gas Use

Information for community natural gas use was provided by Southern California Gas Company (SoCalGas) account representative, Alma Briseno, ABriseno@semprautilities.com.

Community Sector	Community Sub-Sector	Natural Gas Use (therms)
Residential	Single Family	16,993,933
	Multi Family	834,416
Commercial / Industrial	Non-Residential	12,784,419
	Municipal	430,399
TOTAL		**31,043,167**

Propane Use

Inventory for propane use is very limited because, unlike natural gas, propane sales are decentralized, and not all the companies selling propane in Visalia had or provided records for 2005. Propane use from one major distributor in Visalia (Windmill Propane) is included in the inventory. Windmill Propane (559.269.7831) reported sale of 2,700,00 gallons of propane in Visalia in 2005. Windmill Propane also provided estimated % breakdown of sale by sector. Agriculture

propane sale was combined into commercial/industrial sector. The "Other" propane sale category was distributed evenly into the residential and commercial/industrial sectors.

Sale Sector	Estimated % Breakdown	Propane Use (gallons)
Residential	40%	1,080,000
Commercial	20%	540,000
Agricultural	30%	810,000
Other	10%	270,000
TOTAL	**100%**	**2,700,000**

Sector	Propane Use (gallons)
Residential	1,215,000
Commercial/Industrial	1,485,000
TOTAL	**2,700,000**

Transportation

On-Road Vehicles (Local and Highway)

Category	Annual Vehicle Miles of Travel
Local roads [1]	429,572,150
State highways [2]	242,577,539
Total	**672,149,689**

[1] Local Roads Vehicle Miles Traveled (VMT) 2005 data were obtained from Caltrans, which compiles and publish statewide VMT data annually. Source: California Department of Transportation, see "2005 Public Road Data" from Highway Performance Monitoring System (HPMS) Data in http://www.dot.ca.gov/hq/tsip/hpms/datalibrary.php. Table 6 - 2005 maintained mileage & daily vehicle miles of travel estimates by jurisdiction. Table 6 Daily Vehicle Miles Traveled (DVMTs) only includes VMTs within the Visalia jurisdiction boundary for streets/roads that are maintained and controlled by the City and does not include state highway DVMTs. Information confirmed via phone call and email exchange with Craig Wahl, Caltrans, craig.wahl@dot.ca.gov; (916) 654-2980.

[2] State highways 63, 198, and 216 directly intersected Visalia's jurisdiction in 2005. Visalia's "share" of the VMT for the 3 state highways in 2005 was estimated by multiplying 1) the % make up of the 2005 VMT for each of the 3 highways relative to all of the county's 2005 state highway VMT (1,788,128,044 VMT) (provided in the table below) with 2) the county's total state highway 2005 VMT (1,788,128,044 VMT) with 3) Visalia's total VMT % share among the combined VMTs of all the municipalities in Tulare County (53.4%) (obtained from table below).

2005 Daily Vehicle Miles Traveled (DVMT) and Annual Vehicle Miles Traveled (AVMT) By State Highway in Tulare County

State Highway Route	DVMT	AVMT	%
43	59,012	21,539,453	1.2%
63	***379,366***	***138,468,719***	***7.7%***
65	501,371	183,000,340	10.2%
99	2,437,016	889,511,012	49.7%
137	206,302	75,300,321	4.2%
180	1,691	617,324	0.0%
43	291,411	106,365,054	5.9%
198	***762,407***	***278,278,520***	***15.6%***
201	95,768	34,955,430	2.0%
216	***102,968***	***37,583,502***	***2.1%***
245	61,667	22,508,367	1.3%
Total	**4,898,981**	**1,788,128,044**	**100.0%**

Source: Craig Wahl, Caltrans, craig.wahl@dot.ca.gov; (916) 654-2980

Jurisdiction	DVMT	AVMT	%
Dinuba	129,150	47,139,750	5.9%
Exeter	55,130	20,122,450	2.5%
Farmersville	49,420	18,038,300	2.2%
Lindsay	57,110	20,845,150	2.6%
Porterville	378,950	138,316,750	17.2%
Tulare	344,000	125,560,000	15.6%
Visalia	***1,176,910***	***429,572,150***	***53.4%***
Woodlake	13,600	4,964,000	0.6%
Total	**2,204,270**	**804,558,550**	**100.0%**

Source: California Department of Transportation, see "2005 Public Road Data" from Highway Performance Monitoring System (HPMS) Data in http://www.dot.ca.gov/hq/tsip/hpms/datalibrary.php

Aircraft

Aviation gasoline and jet fuel sale for 2005 at the Visalia's Municipal Airport was provided by Mario Cifuentez, City of Visalia.

Airport Fuel Sales by Gallons

2005	Fuel Type	
	Aviation gas	Jet fuel
January	5,765.00	10,341.60
February	11,451.90	14,642.40
March	11,129.20	12,451.80
April	11,129.20	12,452.70
May	11,697.30	11,457.20
June	11,233.70	12,618.20
July	12,140.30	14,829.60
August	13,795.00	24,110.30
September	18,536.70	22,922.40
October	16,306.90	14,606.00
November	12,799.90	13,865.50
December	7,798.70	12,082.50
TOTAL	**143,783.80**	**176,380.20**

Off-Road Vehicles

Off-road transportation emissions for the entire population of Visalia were based on average per capita emissions calculated for each off road vehicle class for Tulare County. Emissions for each off-road class for Tulare County were obtained from type and amount of fuel consumed from the California Air Resources Board's Off Road Emissions Model software.[76] Emissions from select off-road vehicle categories were omitted from Visalia's inventory, as they are not relevant to Visalia. These include emissions from logging equipment, military tactical support equipment, pleasure craft, and railyard operations. Emissions for airport ground support equipment were updated using specific off-road vehicle information provided by Mario Cifuentez, City of Visalia.

Solid Waste

2005 tonnage information for green waste, landfilled solid waste, and recyclables were provided by Betsy McGovern-Garcia, City of Visalia and Anne Magana, Consolidated Waste Management Authority, amagan@ci.visalia.ca.us. EPA WARM model (Feb 2012 - online version; http://www.epa.gov/climatechange/waste/calculators/Warm_Form.html) was utilized to calculate emissions from landfill waste, compost, and recyclables. Inputs: LGC recovery (assume gas flared-more conservative than recover for energy option), distance to waste management facilities was set at 0 miles, yard trimmings for compost and mixed recyclable options used. Woodville and Visalia landfills, which receive about 54% of Visalia's community waste, both have comprehensive landfill gas (LFG) collection system. Source: Patty Ackley, from 2000 inventory information.

Assume no emissions from alternative daily cover (ADC). The two main landfills, Visalia Disposal Site and Kettleman Hills, where about 91% of Visalia's landfill solid waste was sent in 2005 were reported to not have any ADC in 2005 or the facility utilized soil (respectively), which is assumed to have no associated emissions. Information for the Kettleman Hills facility was obtained from Celio Barrera, cbarrera@wm.com, and information about Kettleman Hills was obtained through (559) 386-9711.

[76] California Air Resources Board's Off Road Emissions Model software http://www.arb.ca.gov/msei/offroad/offroad.htm.

II. Municipal GHG Emissions Inventory

Electricity and Natural Gas Use from Municipal Buildings/Facilities
Information for municipal electricity use for 2005 was provided by SCE account representative, Mark Okino, mark.okino@sce.com. Information for municipal natural gas use for 2005 was provided by SoCalGas account representative, Alma Briseno, ABriseno@semprautilities.com. For details on each building/facility's energy use, see Appendix A.3.

SCE electricity rate 2005: $0.13/kWh (Avg retail electricity rate for SCE territory 2005; Source: http://www.energy.ca.gov/2007publications/CEC-200-2007-013/CEC-200-2007-013-SD.PDF). SoCalGas natural gas (G10) rate (2005): $0.86047 / therm (Source: Alma Briseno, ABriseno@semprautilities.com)

Vehicle Fleet
2005 vehicle fleet information was provided by Michael Morgantini, City of Visalia. Information was broken down by vehicle type, City department, fuel use quantity, fuel type, vehicle description and year, and on/off road category.

Airport fleet information was provided by Mario Cifuentez, City of Visalia. Since 2005 fuel use information was not available (all old records purged), 2006 records were utilized instead. Aside for the Enterprise fuel information (see details below), based on feedback from Mr. Cifuentez, 2005 fuel use for all other vehicles was similar to 2006 fuel use info. Enterprise vehicle fuel use in 2005 was adjusted based on feedback from Mr. Cifuentez below.

The only major change between 2005 and 2006 in airport fleet: Enterprise, the rental car business, operated in 2005 and ceased operation in 2006. That would have led to a significant decline in fuel use from one year to the next. Prior to the closing of the Enterprise operation in June 2005, they averaged approximately 500 gallons per month for their rental fleet. The 500 gallons/month was used as an estimate for calculating 2005 fuel use information.

Price of fuel in 2005 (based on information provided by Transit Department):

- Diesel: $3.04/gallon
- Gasoline: $2.71/gallon
- CNG: $2.22/gallons of gasoline equivalent (gge)

Transit Fleet
Transit fleet information was provided by Linda Lee, Transit, City of Visalia. 2005 data is no longer available for fuel use. To approximate fuel use, Linda took total fuel gallons and cost for 2005 and divided them equally among the transit vehicles. Information was broken down by vehicle type, fuel use quantity, fuel type, and vehicle description and year.

Price of fuel in 2005 (based on information provided by Transit Department):

- Diesel: $3.04/gallon
- Gasoline: $2.71/gallon
- CNG: $2.22/gge

Employee Commute
An online survey (via SurveyMonkey) was utilized to collect information on employee commute in 2005. Please see Appendix A.4 for copy of survey. A total of 178 employees completed the survey, of

which 125 were employed by the City in 2005 (there were a total of approximately 646 full-time equivalent employees in 2005). This represents a 19% response rate for 2005. The information collected from the 125 employees was used to extrapolate total emissions for all employees in 2005. Fuel economy for each relevant vehicle was researched and obtained through www.fueleconomy.gov to calculate estimated gallons of fuel used for commute in 2005 (total annual mileage traveled for commute was obtained through the online survey).

Price of fuel in 2005 (based on information provided by Transit Department):

- Diesel: $3.04/gallon
- Gasoline: $2.71/gallon

Solid Waste

Based on contacts with City staff, the amount of solid waste generation by municipal operations was unavailable and unknown. Therefore, waste generation by municipal operations was estimated based on secondary research. Data from studies conducted in the 2000s indicate that average lbs/day/employee is approximately 4.47 lbs/employee/day. This information is based on the average of figures found from three different studies that assessed solid waste generation from commercial offices: 1) 2.6 lbs/day/employee[77].

Based on the 4.47 lbs of solid waste generated/employee/day and 581 full-time equivalent city employees, it was estimated that in 2005, City of Visalia generated approximately 338 tons of solid waste. 581 FTE based on 516 full-time and 130 part-time. Assume 2 part-time = 1 full time equivalent. Source: Linda Wright, Payroll Specialist, Human Resources, (559) 713-4377 lwright@ci.visalia.ca.us.

Of the 338 tons of solid waste generated, it was estimated that 16 tons were recycled and 216 tons were composted. That leaves 105 tons of waste that were sent to the landfills. Landfilled waste hauling cost: $31/ton (Source: Anne Magana , Consolidated Waste Management Authority).

Recycled solid waste from the municipal sector was also unavailable and unknown. Recycled solid waste from the municipal sector was estimated by calculating average tons of recyclables/worker in Visalia in 2005. This information was derived from the following data points: 1) total tons of recycled by Visalia community in 2005: 15,029 tons (Source: Betsy McGovern-Garcia, City of Visalia); 2) % of commercial recyclables make up in Visalia's commercial sector in 2005: 11% (Source: Earl Nielsen, City of Visalia. The separated % [between residential and commercial sectors] is based on 2006 information, which is the first year the City started keeping separated data. 11% of the total recyclables was commercially collected and 89% was residentially collected. Assume same percentage in 2005.); 3) total tons recycled by Visalia's commercial sector in 2005 equals 1,653.17 tons; 4) tons of recyclables/worker in Visalia in 2005: 0.028. Based on 2005 total employment in Visalia of 59,301, which was extrapolated from 2010-2030 figures provided in the 2013 draft General Plan Update); 5) number of FTE in Visalia in 2005: 581 (581 FTE based on 516 full-time and 130 part-time. Assume 2 part-time = 1 full time equivalent. Source: Linda Wright,

[77] http://www.nyc.gov/html/dcp//pdf/env_review/evles/14_feis.pdf; 2) 9.31 pounds/day/employee – Source: http://www.arlingtonva.us/departments/EnvironmentalServices/SW/file84429.pdf; 3) 1.5 pounds/day/employee – Source: http://books.google.com/books?hl=en&lr=&id=VO-. The 4.47 lbs/employee/day is in line with an older study from 1990 that looked at solid waste generation from the government sector (Santa Barbara, 4.54 lbs/day/employee) – Source: http://www.calrecycle.ca.gov/wastechar/wastegenrates/Institution.htm.

Payroll Specialist, Human Resources, (559) 713-4377 lwright@ci.visalia.ca.us). Recycling hauling cost: $23.10/ton (Source: Anne Magana, Consolidated Waste Management Authority).

The amount of compost generated municipally in 2005 (mostly plant debris from street department) was estimated by considering the municipal portion (in tons) of total compost reported by Tulare County Compost & Biomass (compost contractor) in 2005. In 2005, the Visalia community generated 28,783.73 tons of compost, which TCCB collected. Of that amount, 200.15 tons was reported by TCCB to be municipal compost. The 200.15 tons represent a 0.7% municipal compost make up from all of the community's collected compost in 2005. Then assuming that this percentage of municipal compost to community compost held true and could be applied to the more accurate estimate of compost collected for entire community from 2005 (30,886 was reported), that would mean that municipal operations generated 216 tons of compost in 2005 (0.7% x 30,886 tons compost from community). Also, since the City collects plant debris from basically all public areas in the City, the municipal compost tons will probably be significantly higher than a typical house/business in the community. Compost hauling cost: $20/ton (Source: Patty Ackley, Tulare County Solid Waste Manager, packley@co.tulare.ca.us).

Assume no emissions from alternative daily cover (ADC). The two main landfills, Visalia Disposal Site and Kettleman Hills, where about 91% of Visalia's landfill solid waste was sent in 2005 were reported to not have any ADC in 2005 or the facility utilized soil (respectively), which is assumed to have no associated emissions. Information for the Kettleman Hills facility was obtained from Celio Barrera, cbarrera@wm.com, and information about Kettleman Hills was obtained through (559) 386-9711.

EPA WARM model (Feb 2012 - online version; http://www.epa.gov/climatechange/waste/calculators/Warm_Form.html) was utilized to calculate net emissions from landfill waste, compost, and recyclables. Inputs: National Average, distance to waste management facilities was set at 0 miles.

Water/Wastewater Treatment Operations
Wastewater treatment process can create a unique set of process and fugitive GHG emissions. Wastewater from domestic and industrial sources is treated to remove soluable organic matter, suspended solids, pathogenic organisms, and chemical contaminants. Specific to Visalia's WCP, CH4 emissions may have resulted from incomplete combustion of wastewater treatment biogas with anaerobic digestion of biosolids. Process N2O emissions may also have resulted from the WCP as it currently does not have a nitrification/denitrification system. Estimated amounts of nitrogen discharged to WCP's municipal treatment system also helps to approximate process N2O emissions from effluent discharge. Source: Local Government Operation Protocol, 2010 version 1.1. Equations provided below are from Local Government Operation Protocol, 2010 version 1.1. Relevant wastewater treatment information provided by Jim Ross, City of Visalia.

- Stationary CH4 Emissions from Incomplete Combustion of Digester Gas

Equation 10.1	Stationary CH_4 from Incomplete Combustion of Digester Gas (site-specific digester gas data)
Annual CH_4 emissions (metric tons CO_2e) =	
(Digester Gas x F_{CH4} x $\rho(CH_4)$ x (1-DE) x 0.0283 x 365.25 x 10^{-6}) x GWP	

Where:

Term		Description	Value
Digester Gas	=	measured standard cubic feet of digester gas produced per day [ft^3/day]	user input
F CH_4	=	measured fraction of CH_4 in biogas	user input
$\rho(CH_4)$	=	density of methane at standard conditions [g/m^3]	662.00
DE	=	CH_4 Destruction Efficiency	.99
0.0283	=	conversion from ft^3 to m^3 [m^3/ft^3]	0.0283
365.25	=	conversion factor [day/year]	365.25
10^{-6}	=	conversion from g to metric ton [metric ton/g]	10^{-6}
GWP	=	Global Warming Potential	21

Source: EPA *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2007*, Chapter 8, 8-7 (2009).

Digester gas (ft3)/day [1]	F CH4 (measured fraction of CH4 in biogas) [1]	p(CH4)	(1-DE)	Annual CH4 emissions (metric tons)	Annual CO2e emissions
134,958	0.63	662	0.0100	5.82	122.18

- N2O Process Emissions from Wastewater Treatment Plants without Nitrification/Denitrification

Equation 10.8	Process N_2O Emissions from WWTP without Nitrification/Denitrification
Annual N_2O emissions (metric tons CO_2e) =	
((P_{total} x $F_{ind\text{-}com}$) x EF w/o nit/denit x 10^{-6}) x GWP	

Where:

Term		Description	Value
P_{total}	=	population that is served by the centralized WWTP adjusted for industrial discharge, if applicable [person]	user input
$F_{ind\text{-}com}$	=	factor for industrial and commercial co-discharge waste into the sewer system	1.25
EF w/o nit/denit	=	emission factor for a WWTP without nitrification/denitrification [g N_2O/person/year]	3.2
10^{-6}	=	conversion from g to metric ton [metric ton/g]	10^{-6}
GWP	=	Global Warming Potential	310

Source: EPA *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2007*, Chapter 8, 8-13 (2009).

P total (population that is served by the WWTP) [2]	F (ind-com)	EF w/o nit/denit	Annual N2O emissions (metric tons)	Annual CO2e emissions (metric tons)
110,020	1.25	3.2	0.44	136.42

- N2O Process Emissions From Effluent Discharge

Equation 10.9	Process N_2O Emissions from Effluent Discharge (site-specific N load data)
Annual N_2O emissions (metric tons CO_2e) =	
(N Load x EF effluent x 365.25 x 10^{-3} x 44/28) x GWP	

Where:

Term		Description	Value
N Load	=	measured average total nitrogen discharged [kg N/day]	user input
EF effluent	=	emission factor [kg N_2O-N/kg sewage-N produced]	0.005
365.25	=	conversion factor [day/year]	365.25
10^{-3}	=	conversion from kg to metric ton [metric ton/kg]	10^{-3}
44/28	=	molecular weight ratio of N_2O to N_2	1.57
GWP	=	Global Warming Potential	310

Source: EPA *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2007*, Chapter 8, 8-13 (2009).

N Load (measured average total nitrogen discharged (kg N/day)) [3]	**EF effluent**	**Annual N2O emissions (metric tons)**	**Annual CO2e emissions (metric tons)**
1,109.66	0.005	3.18	987.20

[1] 49,259,670 cubic feet of digester gas produced in 2005. For daily gas production, divided number by 365. Source: Jim Ross, Sanitation / Storm, jross@ci.visalia.ca.us, 559.713.4466
[2] Source: July 2005 population data. https://www.google.com/publicdata/explore?ds=kf7tgg1uo9ude_&met_y=population&idim=place:0682954&dl=en&hl=en&q=visalia,%20ca%20population%20trends. Google Public Data for City of Visalia population. Based on U.S. Census Data.
[3] In 2005, nitrogen discharge was 24.36 mg N / liter where the daily flow was 12.035 million gallons. Source: Jim Ross, Sanitation / Storm, jross@ci.visalia.ca.us, 559.713.4466. To calculate kg N/day = (24.36 mg/liter) * (1kg/1,000,000mg) * (3.785 liter/1 gallon) * (12.035 million gallons/day)

Refrigerants – Buildings
Local Government Operation Protocol, 2010 version 1.1 was used to estimate HFCs from refrigerants from municipal buildings in 2005.

Equation 6.35	**Estimating Emissions of Each Type of Refrigerant**

For each type of refrigerant:

$$\text{Total Annual Emissions (metric tons)} = [\,(C_N \times k) + (C \times x \times T) + (C_D \times y \times (1 - z))\,] \div 1{,}000$$

(kg) (%) (kg) (%) (years) (kg) (%) (%) (kg/metric ton)

Where:
C_N = quantity of refrigerant charged into the new equipment [1]
C = total full charge (capacity) of the equipment
T = time in years equipment was in use (e.g., 0.5 if used only during half the year and then disposed)
C_D = total full charge (capacity) of equipment being disposed of [2]
k = installation emission factor [1]
x = operating emission factor
y = refrigerant remaining at disposal [2]
z = recovery efficiency [2]

[1] Omitted if no equipment was installed during the reporting year or the installed equipment was pre-charged by the manufacturer
[2] Omitted if no equipment was disposed of during the reporting year

Table 6.4 Default Emission Factors for Refrigeration / Air Conditioning Equipment

Type of Equipment	Capacity (kg)	Installation Emission Factor k (% of capacity)	Operating Emission Factor x (% of capacity / year)	Refrigerant Remaining at Disposal y (% of capacity)	Recovery Efficiency z (% of remaining)
Domestic Refrigeration	0.05 - 0.5	1 %	0.5 %	80 %	70 %
Stand-alone Commercial Applications	0.2 - 6	3 %	15 %	80 %	70 %
Medium & Large Commercial Refrigeration	50 - 2,000	3 %	35 %	100 %	70 %
Industrial Refrigeration including Food Processing and Cold Storage	10 - 10,000	3 %	25 %	100 %	90 %
Chillers	10 - 2,000	1 %	15 %	100 %	95 %
Residential and Commercial A/C including Heat Pumps	0.5 - 100	1 %	10 %	80 %	80 %

Source: IPCC, *Guidelines for National Greenhouse Gas Inventories* (2006), Volume 3: Industrial Processes and Product Use, Table 7.9.
Note: Emission factors above are the most conservative of the range provided by the IPCC. The ranges in capacity are provided for reference. You should use the actual capacity of your equipment. If you do not know your actual capacity, you should use the high end of the range provided (e.g., use 2,000 kg for chillers).

- Refrigerants From Commercial/Industrial Refrigerator Units

Total # of Domestic Refrigerators [1]	Estimated # of Domestic Refrigerators Disposed in 2005 [2]	Estimated # of Remaining Refrigerators	Time refrigerators used (yr) [3]	Capacity (kg) [4]	Annual HFC-134a Emissions for all refrigerators (metric tons) [5]	Annual CO2e Emissions for all refrigerators (metric tons)
27	0.0	27	1	0.5	**0.0001**	**0.09**

[1] Source: Joe Garcia in Visalia Building Department, jgarcia2@ci.visalia.ca.us, 559-713-4304
[2] Assume no refrigerators disposed in 2005
[3] Assume refrigerators used 365 days in 2005
[4] LGOP default figure used
[5] Refrigerant is HFC-134a. Source: Joe Garcia, City of Visalia.

- Refrigerants From Commercial/Industrial A/C Units

Total # of Commercial A/C [1]	Estimated # of Total A/C units Disposed in 2005 [2]	Estimated # of Remaining R410a A/C [1]	Estimated # of R22 Remaining A/C [1]	Time A/C used (yr) [3]	Average Capacity (kg) [6]	Annual R-410A Emissions (metric tons) [5]	Annual R-22 Emissions (metric tons) [5]	Annual CO2e Emissions for all refrigerators (metric tons) [7]
122	0	27	95	1	6	0.0002	0.0006	1.27

[1] 122 units in 2005. 27 of the 2005 HVAC units used R410a (22.13%), and 95 used R-22 (77.87%). Source: Joe Garcia, jgarcia2@ci.visalia.ca.us, 559-713-4304
[2] Assume no units disposed in 2005
[3] All units used 365 days in 2005
[4] A/C units were all pre-charged by manufacturer
[5] 27 of the 2005 HVAC units used R410a (22.13%), and 95 used R-22 (77.87%). Source: Joe Garcia, City of Visalia.

[6] Capacity based on calculations from tons of HVAC information provided by Joe Garcia. Based on tons of each HVAC equipment, kg charge was estimated using the following assumptions: 1) According to the Clean Air Act findings, Commercial Air Conditioning Units, which cool spaces "from 30,000 to 100,000 square feet and are charged with about 500 pounds [of refrigerant]". Assuming that the majority of commercial and industrial buildings are between 30,000 to 100,000 square feet, 500 pounds is used in this calculation. Further, the average size of this range (65,000) is used as a basis to determine kg/sqft (.003492); 2) The following sources were used for determining an average cooling capacity in sqft / ton (400 sqft/ton)
http://www.gearypacific.com/ComfortZone/37%20Comfort_Classroom%20not%20Office.pdf,
http://www.inspect-ny.com/aircond/aircond03.htm,
http://www.arch.hku.hk/teaching/SBT99/lesshvac.pdf
[7] R-22 refrigerant global warming potential: 1700. Source:
http://www.engineeringtoolbox.com/refrigerants-properties-d_145.html
R410A GWP = 1725. Source: LGO Protocol. 2008. Table E.2

Refrigerants – Vehicle and Transit Fleet
Local Government Operation Protocol, 2010 version 1.1 was used to estimate HFCs from refrigerants from vehicle and transit fleet in 2005.

Equation 7.13 **Estimating Emissions of Each Type of Refrigerant**

For each type of refrigerant:

$$\underset{\text{(metric tons)}}{\text{Total Annual Emissions}} = [\ (C_N \times k) + (C \times x \times T) + (C_D \times y \times (1 - z))\ ] \div 1{,}000$$

(kg) (%) (kg) (%) (years) (kg) (%) (%) (kg/metric ton)

Where:
C_N = quantity of refrigerant charged into the new equipment [1]
C = total full charge (capacity) of the equipment
T = time in years equipment was in use (e.g., 0.5 if used only during half the year and then disposed)
C_D = total full charge (capacity) of equipment being disposed of [2]
k = installation emission factor [1]
x = operating emission factor
y = refrigerant remaining at disposal [2]
z = recovery efficiency [2]

[1] Omitted if no equipment was installed during the reporting year or the installed equipment was pre-charged by the manufacturer
[2] Omitted if no equipment was disposed of during the reporting year

Table 7.2 Default Emissions for Mobile Refrigeration / Air Conditioning Equipment

Type of Equipment	Capacity (kg)	Installation Emission Factor k (% of capacity)	Operating Emission Factor x (% of capacity / year)	Refrigerant Remaining at Disposal y (% of capacity)	Recovery Efficiency z (% of remaining)
Transport Refrigeration	3 - 8	1 %	50 %	50 %	70 %
Mobile Air Conditioning	0.5 – 1.5	0.5 %	20 %	50 %	50 %

Source: IPCC, *Guidelines for National Greenhouse Gas Inventories* (2006), Volume 3: Industrial Processes and Product Use, Table 7.9.
Note: Emission factors above are the most conservative of the range provided by the IPCC. The ranges in capacity are provided for reference. You should use the actual capacity of your equipment. If you do not know your actual capacity, you should use the high end of the range provided (e.g., use 2,000 kg for chillers).

Department	Emissions from Mobile refrigerants (MT)	CO2e (MT)
Community Development	0.0040	5.25
Convention Center	0.0006	0.75
Fire	0.0047	6.06
Parks & Rec	0.0114	14.87

Planning	0.0003	0.39
Police	0.0434	56.39
Public Works	0.0266	34.63
Admin Department	0.0003	0.38
Transit	0.0646	110.58
Airport	0.0012	1.51
Total	**0.16**	**230.81**

For all appropriate vehicle and transit fleet, the above equation and mobile air conditioning default emissions factors were utilized to estimate CO2e emissions from mobile refrigerants. R-134a, R-22, and R-12 were used as refrigerants in 2005. R-134a = 13000 GWP (Source: LGO Protocol Appendix E). R-22 global warming potential: 1700. (Source: http://www.engineeringtoolbox.com/refrigerants-properties-d_145.html)
R-12 global warming potential: 2400. (Source: http://www.engineeringtoolbox.com/Refrigerants-Environment-Properties-d_1220.html).

Additional assumptions used: 1) All new vehicles have been pre-charged by manufacturer; 2) Assume no vehicles disposed in 2005.

Sources for refrigerants from vehicle and transit fleet were provided by City of Visalia staff. For Airport, emissions from Enterprise vehicles have not been included because the number of vehicles that existed in 2005 is unknown. Enterprise went out of operation at the Visalia Airport in 2006.

APPENDIX A.2. –DETAILED OFF-ROAD EQUIPMENT LIST FOR 2005

Below is a detailed list of the off-road equipment that was included in the 2005 Visalia inventory categorized by equipment class. Off-road equipment/vehicle class and equipment and output were derived from California Air Resources Board's Off Road Emissions Model software. (http://www.arb.ca.gov/msei/offroad/offroad.htm).

Industry	Equipment
Recreational and Entertainment Vehicles	All Terrain Vehicles (ATVs) Golf Carts Minibikes Off-Road Motorcycles Snowmobiles Specialty Vehicles Carts Compressor Generator
Construction and Mining	Asphalt Pavers Bore/Drill Rigs Cement and Mortar Mixers Concrete/Industrial Saws Cranes Crawler Tractors Crushing/Proc. Equipment Dumpers/Tenders Excavators Graders Off-Highway Tractors Off-Highway Trucks Other Construction Equipment Pavers Paving Equipment Plate Compactors Rollers Rough Terrain Forklifts Rubber Tired Dozers Rubber Tired Loaders Scrapers Signal Boards Skid Steer Loaders Surfacing Equipment Tampers/Rammers Tractors/Loaders/Backhoes Trenchers
Industrial	Aerial Lifts Forklifts Other General Industrial Equipment Other Material Handling Equipment Sweepers/Scrubbers
Lawn and Garden	Chainsaws Chainsaws Preempt Chippers/Stump Grinders Commercial Turf Equipment Front Mowers Lawn & Garden Tractors Lawn Mowers Leaf Blowers/Vacuums Other Lawn & Garden Equipment Rear Engine Riding Mowers Shredders Snowblowers Tillers Trimmers/Edgers/Brush Cutters Wood Splitters

Industry	Equipment
Airport Ground Support	A/C Tug Narrow Body A/C Tug Wide Body Air Conditioner Air Start Unit Baggage Tug Belt Loader Bobtail Cargo Loader Cargo Tractor Cart Catering Truck Compressor (GSE) Deicer Forklift Fuel Truck Generator Ground Power Unit Hydrant truck Lav Cart Lav Truck Lift Maint. Truck Other Other GSE Passenger Stand Service Truck Sweeper Water Truck
Commercial	Air Compressors Gas Compressors Generator Sets Pressure Washers Pumps Welders
Agricultural	2-Wheel Tractors Agricultural Mowers Agricultural Tractors Balers Combines Hydro Power Units Other Agricultural Equipment Sprayers Swathers Tillers

APPENDIX A.3. – 2005 ELECTRICITY AND NATURAL GAS USE – ALL CITY USES

The two tables below provide detailed information on the electricity and natural gas use of all city uses (includes buildings/facilities, water/wastewater, streetlights, etc.).

2005 Electricity Use – All City Uses

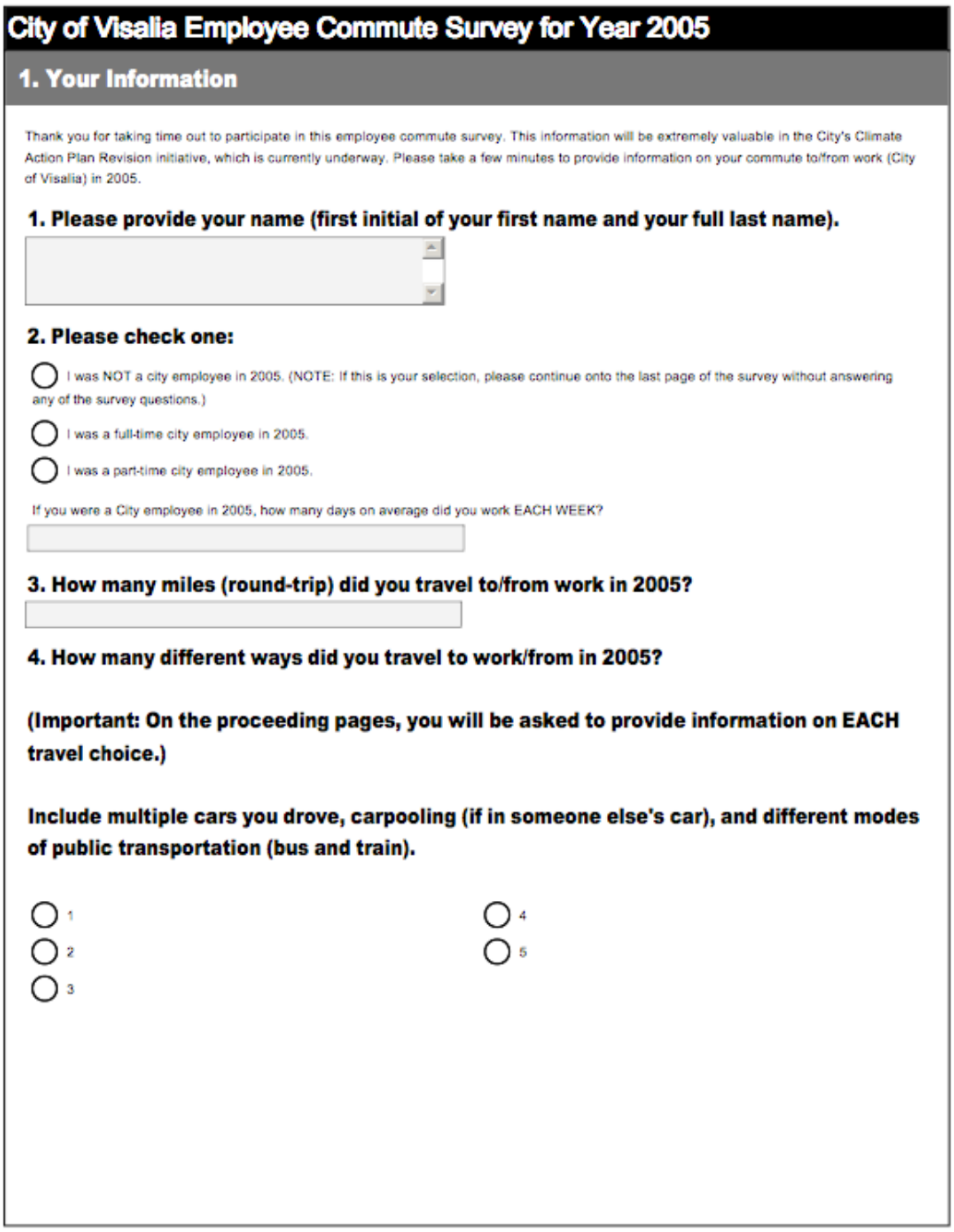
Facility Name	Electricity Use (kWh)	Cost	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	CO2e (metric tons
Airport - Airline Terminal	76,532	$10,389	23.1101	0.001	0.000	23.25
Airport	108,392	$17,408	32.731	0.001	0.001	32.93
Anthony Community Center	148,640	$21,356	44.8842	0.002	0.001	45.16
Blain Park	2,584	$523	0.7803	0.000	0.000	0.79
Business Terminal With Solar	94,590	$13,679	28.5630	0.001	0.000	28.74
City Hall East	492,546	$67,640	148.7321	0.007	0.002	149.63
City Hall North	241,877	$31,404	73.0386	0.003	0.001	73.48
City Hall West	253,180	$37,911	76.4517	0.003	0.001	76.92
Constitution Park	522	$229	0.1576	0.000	0.000	0.16
Convention Center	1,192,754	$175,451	360.1710	0.016	0.006	362.36
Corp Yard Ben Maddox - Fleet Services	192,993	$26,838	58.2773	0.003	0.001	58.63
Corp Yard Ben Maddox - Police Dept. - Adobe Office	7,632	$1,210	2.3046	0.000	0.000	2.32
Corp Yard Ben Maddox - Public Works/Parks & UF	19,824	$3,035	5.9862	0.000	0.000	6.02
Corp Yard Ben Maddox - Traffic Safety - Office and Shop	17,026	$2,608	5.1413	0.000	0.000	5.17
Fire Station #4	58,202	$8,468	17.5750	0.001	0.000	17.68
Fire Station # 2	48,300	$6,890	14.5850	0.001	0.000	14.67
Golf Club House/ Pro Shop/ Golf Cart Storage/ Concession Buildings & Restroom Building	399,983	$61,299	120.7812	0.005	0.002	121.51
Houk Park	5	$165	0.0015	0.000	0.000	0.00
Lincoln Oval Park	1,596	$372	0.4819	0.000	0.000	0.48
Manuel F. Hernandez Community Center	129,240	$17,831	39.0261	0.002	0.001	39.26
Mayors Park	1	$175	0.0003	0.000	0.000	0.00
Memorial Park	4,151	$675	1.2535	0.000	0.000	1.26
Mill Creek Park	1	$176	0.0003	0.000	0.000	0.00
Oval Service Center	14,058	$2,117	4.2450	0.000	0.000	4.27
Pappas Memorial Park	1	$175	0.0003	0.000	0.000	0.00
Pinkham Park	684	$286	0.2065	0.000	0.000	0.21

Facility Name	Electricity Use (kWh)	Cost	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)	CO2e (metric tons
Police - HQ/Fire Station #1	9,949	$1,502	3.0043	0.000	0.000	3.02
Police Department	432	$245	0.1304	0.000	0.000	0.13
Police Station	7	$176	0.0021	0.000	0.000	0.00
Police/Fire	511,800	$63,364	154.5461	0.007	0.003	155.48
Rawhide Park	55,701	$19,979	16.8198	0.001	0.000	16.92
Ruiz Park	12,382	$1,810	3.7389	0.000	0.000	3.76
Solid Waste - Admin Warehouse, Shop	53,760	$8,404	16.2337	0.001	0.000	16.33
Street Lighting	3,239,608	$618,572	978.2511	0.044	0.016	984.19
Traffic Control	543,721	$63,333	164.1853	0.007	0.003	165.18
Valley Oak Golf - Club House Parking	114,540	$15,054	34.5872	0.002	0.001	34.80
Valley Oak Golf - Maintenance Shop	34,020	$4,834	10.2729	0.000	0.000	10.34
Visalia Oaks Stadium	3,671	$469	1.1085	0.000	0.000	1.12
Visalia Senior Center	140,920	$21,588	42.5530	0.002	0.001	42.81
Water/Wastewater (excluding WCP)	980,177	$166,236	295.9800	0.013	0.005	297.78
Water Conservation Plant	3,565,400	$400,950	1,076.6291	0.049	0.018	1,083.16
Whitendale Community Center	25,220	$4,971	7.6156	0.000	0.000	7.66
Whitendale Park	181	$197	0.0547	0.000	0.000	0.05
Willow Glen Park	6	$165	0.0018	0.000	0.000	0.00
Woodland Park	2,768	$507	0.8358	0.000	0.000	0.84
Miscellaneous	350,886	$81,487	105.9556	0.005	0.002	106.60
TOTAL	**13,150,463**	**$1,982,155**	**3,971**	**0.179**	**0.066**	**3,995**

2005 Natural Gas Use – All City Uses

Facility Name	Natural Gas Use (Therms)	Cost	CO2 (Metric tons)	CH4 (metric tons)	N2O (metric tons)	CO2e (metric tons
Water Conservation Plant	362,571	$311,981	1,922.35	0.181	0.004	1,927.28
Whitendale Community Center	596	$513	3.16	0.000	0.000	3.17
Airport	1,160	$998	6.15	0.001	0.000	6.17
Anthony Community Center	2,221	$1,911	11.78	0.001	0.000	11.81
Manuel F. Hernandez Community Center	3,353	$2,885	17.78	0.002	0.000	17.82
City Hall East	2,265	$1,949	12.01	0.001	0.000	12.04
City Hall West	2,983	$2,567	15.82	0.001	0.000	15.86
City Hall North	644	$544	3.41	0.000	0.000	3.42
Solid Waste - Admin Warehouse, Shop	2,463	$2,119	13.06	0.001	0.000	13.09
Police - HQ/ Fire Station #1	387	$333	2.05	0.000	0.000	2.06
Fire Station # 2	1,399	$1,204	7.42	0.001	0.000	7.44
Fire - Station #4	744	$640	3.94	0.000	0.000	3.95
Corp Yard Ben Maddox - Traffic Safety - Office and Shop	11,493	$9,889	60.94	0.006	0.000	61.09
Valley Oak Golf - Maintenance Shop	1,404	$1,208	7.44	0.001	0.000	7.46
Visalia Senior Center	3,703	$3,186	19.63	0.002	0.000	19.68
Fire Department	223	$192	1.18	0.000	0.000	1.19
Convention Center	20,079	$17,277	106.46	0.010	0.000	106.73
Miscellaneous	12,711	$10,937	67.39	0.006	0.000	67.57
TOTAL	**430,399**	**$370,345**	**2,282**	**0.215**	**0.004**	**2,288**

APPENDIX A.4. – EMPLOYEE COMMUTE ONLINE SURVEY



City of Visalia Employee Commute Survey for Year 2005

1. Your Information

Thank you for taking time out to participate in this employee commute survey. This information will be extremely valuable in the City's Climate Action Plan Revision initiative, which is currently underway. Please take a few minutes to provide information on your commute to/from work (City of Visalia) in 2005.

1. Please provide your name (first initial of your first name and your full last name).

2. Please check one:

- I was NOT a city employee in 2005. (NOTE: If this is your selection, please continue onto the last page of the survey without answering any of the survey questions.)
- I was a full-time city employee in 2005.
- I was a part-time city employee in 2005.

If you were a City employee in 2005, how many days on average did you work EACH WEEK?

3. How many miles (round-trip) did you travel to/from work in 2005?

4. How many different ways did you travel to work/from in 2005?

(Important: On the proceeding pages, you will be asked to provide information on EACH travel choice.)

Include multiple cars you drove, carpooling (if in someone else's car), and different modes of public transportation (bus and train).

- 1
- 2
- 3
- 4
- 5

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City of Visalia Employee Commute Survey for Year 2005

2. Travel Choice

1. For this travel choice, please indicate what mode of travel you used in 2005.

- ◯ Passenger car
- ◯ Light-duty truck/SUV
- ◯ Heavy-duty truck
- ◯ Motorcycle
- ◯ Public transit: Bus
- ◯ Public transit: Train

Other (please specify)

2. Please provide information about the vehicle. If not applicable (for public transportation, especially), please indicate "N/A".

Make	
Model	
Year	
Manual or automatic	
Hardtop or convertible	

3. Was this vehicle a City vehicle? If no, please insert "N/A". If yes, please provide all/any of the following information regarding the City vehicle.

City Vehicle ID#	
Vin #	
License	
Other info that may help ID vehicle	

4. What type of fuel was used?

- ◯ Gasoline
- ◯ Diesel
- ◯ Biodiesel
- ◯ Ethanol
- ◯ Liquified natural gas
- ◯ Compressed natural gas

Other (please specify)

5. Please estimate as best as you can the number of weeks that this mode of travel was used to commute to/from work in 2005 (Note: there are 52 weeks in one year)?

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City of Visalia Employee Commute Survey for Year 2005

7. Employee Commute Programs

1. Please indicate your level of interest in particiating in any of the following programs below to help reduce the City's greenhouse gas emissions (carbon footprint) from employee commute.

	Not interested	Not sure	Somewhat interested	Very interested
Telecommute (working from home)	○	○	○	○
Free bicycles for employee commute funded by the City	○	○	○	○

Comments or any other suggestions for programs?

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APPENDIX B – CALIFORNIA STATE'S EMISSIONS REDUCTION INITIATIVES

Below are descriptions of select California State emissions reduction initiatives that were considered in developing the projected emissions for Visalia. The state emissions resulting from the implementation of the state initiatives are derived from the AB 32 Climate Change Scoping Plan prepared by the California Air Resources Board in 2008. These initiatives represent some of the most widespread and impactful state emissions reduction measures that are in the works.

1. Renewable Portfolio Standard (33% by 2020)

Originally established in 2002, California's Renewable Portfolio Standard requires investor-owned utilities, electric service providers, and community choice aggregators to procure 33% of total energy from eligible renewable energy resources. Senate Bill 2 (2011) codified the RPS of 33% by 2020 into law.

2. AB 1493 (Pavley)

Adopted in 2004 by the ARB, AB 1493 (Pavley) requires a gradual reduction of GHG emissions from new passenger cars and light trucks beginning in 2009. By 2016, this will result in approximately a 30% reduction in emissions per mile for the average new light duty vehicle. To obtain additional reductions from the light duty fleet, ARB plans to adopt a second, more stringent, phase of the Pavley regulations in the near future. California EPA officials estimate that the Pavley Bill will reduce GHG emissions by approximately 30 million metric tons by 2020 and over 50 million metric tons by 2030[78].

3. Low Carbon Fuel Standard

In order to reduce the carbon intensity of transportation fuels, ARB passed the world's first low carbon fuel standard (LCFS) on April 23, 2009 as called for by Governor Schwarzenegger in Executive Order S-01-07. This regulation mandates fuel producers to produce a 10% reduction in carbon content of all passenger vehicle fuels sold in California by 2020. The LCFS will examine the full fuel lifecycle impacts of transportation fuels including fuel consumption and production, such as "upstream" emissions that are major GHG contributors. A 10% reduction in the intensity of transportation fuels is expected to equate to a reduction of 15 million MTCO2E in 2020.

4. Energy Efficiency

The objective of this initiative is to maximize energy efficiency building and appliance standards. In 2003, the California Public Utilities Commission and California Energy Commission adopted an Energy Action Plan that prioritized resources for meeting California's future energy needs, with energy efficiency being the highest priority in this effort. Since then, this policy goal has been codified into statute through legislation that requires electric utilities to meet their resource needs first with energy efficiency. Key energy efficiency strategies under this initiative include:

[78] California Environmental Protection Agency – Air Resources Board.
http://www.arb.ca.gov/cc/ccms/factsheets/ccfaq.pdf

- Cross-cutting Strategy for Buildings
    - "Zero Net Energy" buildings

- Codes and Standards Strategies
    - More stringent building codes and appliance efficiency standards
    - Broader standards for new types of appliances and for water efficiency
    - Improved compliance and enforcement of existing standards
    - Voluntary efficiency and green building targets beyond mandatory codes Strategies for Existing Buildings
    - Voluntary and mandatory whole-building retrofits for existing buildings
    - Innovative financing to overcome first-cost and split incentives for energy efficiency, on-site, renewables, and high efficiency distributed generation

- Existing and Improved Utility Programs
    - More aggressive utility programs to achieve long-term savings

- Other Needed Strategies
    - Water system and water use efficiency and conservation measures
    - Local government programs that lead by example and tap into local authority over planning, development, and code compliance
    - Additional industrial and agricultural efficiency initiatives
    - Providing real time energy information technologies to help consumers conserve and optimize energy performance

On October 19, 2007, the California Public Utilities Commission (CPUC) adopted a target that all commercial buildings be energy neutral by 2030 and all homes built in California after 2020 be energy neutral.

Under the Climate Change Scoping Plan, this initiative also includes emissions reduction estimates for combined heat and power and solar water heating. These two specific sub-initiatives were not included as part of Visalia' reduction target

5. Cap-and-Trade System

On January 1, 2013, California launched a carbon cap-and-trade system, which sets a mandatory, statewide limit on GHG emissions set by CARB and based on verified emissions data. That limit declines 2-3% year, ensuring the overall level of emissions statewide is steadily reduced. Large businesses that emit more than 25,000 metric tons of carbon dioxide are covered under the program. That includes 360 businesses representing 600 facilities across the state. In the first phase of the program (2013-2014), the cap covers electricity suppliers and large industrial sources such refineries and cement companies. After the first phase, the program will expand to include gasoline, diesel, and natural gas providers. California held its first auction for carbon permits in November 2012.

APPENDIX C – EMISSIONS PROJECTIONS ASSESSMENT

The forecast emissions for Visalia's community and municipal sectors include two scenarios:

- Business-as-usual (BAU)
- California State initiatives ("Select State Measures scenario") (takes into account select state level measures for reducing GHG emissions)

The details of the forecast emissions assessment are described below.

1. Business-As-Usual Scenario

Under the BAU scenario, various proxies for forecasting Visalia's community and municipal sectors' emissions were identified. These proxies are listed in the table below.

Relevant Emissions Forecast Proxies	Average Annual Growth Rate (2005-2030)	Source
Population change	2.6%	Tulare County LAFCO, City of Visalia Municipal Service Review (MSR) report for 2005 population (http://www.co.tulare.ca.us/lafco/documents/MSR%20G1_1%20Visalia%20Jan06.pdf); Draft 2013 General Plan Update for 2010 and 2030 population; 2020 population extrapolated using historical and projected population data. The Visalia population growth rate of 2.6% was established by the General Plan Update Review Committee (GPURC) after reviewing various data sources. The CAP utilizes the same growth rate to be consistent with the 2030 General Plan Update.
Job change	1.75%	California Employment Development Department. LMI for Visalia-Porterville Metropolitan Statistical Area. http://www.calmis.ca.gov/htmlfile/msa/visalia.htm/. Under Unemployment Rates and Labor Force, Visalia-Porterville MSA, Labor Force Data (Excel) document (file name visa$hlf).
VMT change	1.33%	California Energy Commission. Transportation Energy Forecasts for the 2007 Integrated Energy Policy Report. September 2007. http://www.energy.ca.gov/2007publications/CEC-600-2007-009/CEC-600-2007-009-SF.PDF. Table 4 page 12.
City employee count change	0.74%	2000 – 2012 employee count provided by City of Visalia. 2020 figure extrapolated using historical data.

For the community sector, the following proxies were utilized:

Sector	Proxy Used	Rational
Residential	Population change	An increase in population usually results in increased activities and energy use in the residential sector, which contributes to increased emissions.
Commercial / Industrial	Job change	Emissions from commercial/industrial sectors usually correlate with job increase/decrease within the community. For example, growth of jobs leads to increased energy use (both direct and indirect), which in turn results in additional emissions.
Transportation	VMT change	Transportation emissions are assumed to be directly proportional to vehicle miles traveled by the vehicles within the community.
Solid Waste	Average annual growth rate of population change and job change	Emissions from waste are highly dependent on the population of Visalia's community and job growth. Population and business growth will result in increased waste generation.

For the municipal sector, the following proxies were utilized:

Sector	Proxy Used	Rational
Buildings/ Facilities	Average of population change, job change, and city employee count change	Emissions from municipal buildings are dependent on the public services provided to the residential and commercial sectors within the community in addition to the number of city employees that work within the municipal facilities. For instance, if population increases, public services will also need to be increased, which will usually result in increased emissions.
Streetlights & Traffic Lights	Average of population change and job change	Emissions from street and traffic lights are impacted by the change in both the residential and commercial sectors of the community. For instance, growing residential and commercial sectors usually translates into the installation of additional street and traffic lights to serve the growing areas.

Sector	Proxy Used	Rational
Water / Wastewater Operations	Average of population change and job change; estimated increase in electricity use by WCP	Emissions from water/wastewater activities are highly dependent upon the change in the number of residents and the workers within the community. The WCP will be undergoing a significant upgrade in the near future. This upgrade is estimated to increase electricity use from 3,565,400 kWh use in 2005 to about 26,864,640 kWh in 2020. This will result in an increase of CO2e from 1,083 MT CO2e to 7,733 MT CO2e (based on SCE's 2007 electricity emission factor for CO2 and California's 2007 electricity emission factor for CH4 and N2O [Source: Local Government Protocol, 2010 version 1.1]). This estimated increase in emissions has been included in the emissions projections for water/wastewater operations sector.
Vehicle Fleet	Average of VMT change and city employee count change	Emissions resulting from municipal fleet are based on the change in the vehicle miles traveled within the community and the number of city employees who utilize and operate the vehicles.
Transit Fleet	VMT change	Emissions resulting from transit fleet are largely based on the change in the vehicle miles traveled within the community.
Airport	Average of population change and job change	Emissions from the municipal airport are dependent on the residential and commercial population that it serves.
Employee Commute	City employee count change	Emissions from employee commute are highly correlated with the number of municipal employees.
Solid Waste	City employee count change	Emissions from solid waste generated within city facilities are dependent on the number of municipal employees.

2. Select State Measures Scenario

The following California emissions reduction initiatives were taken into account for creating the Select State Measures scenario:

- Renewable Portfolio Standard (33% by 2020 and 51% by 2030)
- AB 1493 (Pavley)
- Low Carbon Fuel Standard
- Energy Efficiency (Title 24)
- Electric Vehicle promotion

It is important to note that this is not an exhaustive list of state measures. However, based on the ARB's 2008 Climate Change Scoping Plan, these measures do make up a significant portion of projected state emissions. For detailed descriptions of each state measures, please refer to Appendix B.

Under the state reduction scenario, the impact of the above selected state measures on Visalia community and municipal sectors' 2020 emissions projections were calculated utilizing estimated percentage reductions developed by ARB and extrapolated to 2030 where necessary. These percentage reductions are provided in the table below.

State Measure Impacts on Visalia Community and Municipal Sectors' Emissions Projections in 2030

Sector	State Initiative	% Reduction from 2020 BAU Inventory
On-road passenger/light truck transportation/	AB 1493 (Pavley)	32.8%
All on-road transportation	Low Carbon Fuel Standard	10.8%
Electricity	Renewable Portfolio Standard	33%
Electricity	Energy Efficiency Measures	21.8%
Natural gas	Energy Efficiency Measures	9.5%

Source of California Regulations, Measures, % Reduction: Bay Area Air Quality Management District. California Environmental Quality Act Guidelines, June 2010. Table D-4.

APPENDIX D.1. – QUANTIFICATION OF EXISTING MEASURES

This section provides detailed information, including assumptions that were used to calculate the energy savings and GHG emissions reductions of existing measures in Visalia. The calculated energy savings for the existing measures were translated into emissions reductions using ICLEI's CACP software to ensure the emissions factors were as accurate as possible. The emission factors used in the CACP software for calculating existing measures include the latest information available from the Local Government Operations Protocol (version 1.1, 2010). For electricity use, Southern California Edison's latest available (2007) emission factor for CO2 and the latest California emission factors for CH4 and N2O (2007) were utilized from the Local Government Operations Protocol.

I. Existing Community Measures

1. Solar PV Institutional Barrier Removal

Assumptions used: 1) 1,106.9 kW PV installed between 2013-2020. SSTI launched in spring 2012. Estimated total minimum solar PV capacity in Visalia in Feb 2013: 8.5 MW. Source: California Solar Initiative. CSI Solar program started in January 2006, therefore system installation number is for 2006-2013. http://www.californiasolarstatistics.ca.gov/reports/locale_stats/. Accessed March 5, 2013. Assume there will be at least an additional 13% in solar PV capacity between 2013 and 2020 as a result of this measure. 13% increase based off of AECOM study. Economic and Fiscal Impact Analysis of Residential Solar Permitting Reform. July 2011 (www.sunrunhome.com/download_file/view/415/189/). ICLEI CAPPA version 1.5 was used to calculate annual energy production from solar capacity. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

2. Solar PV Installations

Assumptions used: 18,616 kW PV installed between 2006-2020. Estimated total kW of PV installed between 2007 (2006 CSI data not available) and 2020 by: 1) First, calculating kW generated by systems installed between 2006 and February 2013. The number of solar installs was found on the CSI database, and MW installed was calculated by multiplying the total number of installs by the average system size, which was estimated to be 3.4kW/install; 2) Second, adding the estimated kW that will be generated by systems installed between March 2013 (2013 is calculated as 3/4 a full year) to 2020. To estimate the number of systems installed between March 2013 and 2020, we averaged the number of systems installed in the years between 2007-2012 to get 99.5 average solar PV installs per year. Then we estimated that 3/4 of 99.5 systems would be installed in the rest of 2013, and 99.5 systems would be installed each year from 2014-2020, for a total of 771 systems in that time frame. Finally, we multiplied the estimated number of installs by the current average kW production for a solar system in Visalia (14kW). ICLEI CAPPA version 1.5 was used to calculate annual energy production from solar capacity. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

3. EnergyUpgrade California

Assumptions used: 1) Total number of projects in 2012: 17; 2) Total annual kWh and therms savings: 74,523 kWh and 3,530 therms; 3) assume program/similar program continues to be implemented through 2020 and program yields consistent energy savings results. Energy savings

numbers provided by Amri Christianto, SCE, Customer Energy Efficiency and Solar Division, (626) 302-0718, Amri.Christianto@sce.com.

Total # of Projects	17.00
Average kWh	4,657.69
Average kW	5.02
Average Therms	220.63
Cumulative kWh	74,523.00
Cumulative kW	80.36
Cumulative Therms	3,530.00

4. Southern California Edison Small Business Direct Install Program

Assumptions used: 1) 2011 Visalia small business direct install kWh savings results: 4,114,338. Source: Hoff, Maureen Hoff, mhoff@pesc.com; 2) assume program/similar program continues to be implemented through 2020 and program yields consistent energy savings results.

5. Southern California Gas Weatherization Program

Assumptions used: 1) Estimated number of annual homes weatherized: 1,086 based on total homes weatherized since program inception in Visalia (Oct 2010): 3,800. 3,800 figure source: Jose Landeros, Proteus, josel@proteusinc.org; 2) Assume program/similar program continues to be implemented through 2020 and program yields consistent energy savings results; 3) total estimated total number of homes weatherized in 2020: 11,943; 4) % of homes heated with natural gas and electricity: 75% and 25%, respectively (Source: U.S. Census Bureau. American Fact Finder. Selected Housing Characteristics. 2007-2011 American Community Survey 5-Year Estimates. http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml. Natural gas: 74.1%, electricity: 24.1%, Others [liquefied propane, fuel oil, kerosene, wood, and other]: 1.8%. Assume 75% from natural gas and 25% from electricity); 4) Average annual electricity use and natural gas for heating per household: 2,283 kWh and 246 therms, respectively. Based on heating degree and cooling degree days information provided by ICLEI CAPPA (version 1.5). For Visalia region, based on fewer than 4000 heating degree days. ICLEI CAPPA version 1.5 was used to calculate annual energy savings. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

6. Community Service Employment Training (CSET) Weatherization Program

Assumptions used: 1) Average annual number of homes weatherized from 2001-2012: 151 (Source: Lily Rivera-Graves, Director for Energy & Housing, Community Services Employment Training, (559) 732-4194, lily.rivera@cset.org); 2) Assume program/similar program continues to be implemented through 2020 and program yields consistent energy savings results; 3) % of homes heated with natural gas and electricity: 75% and 25%, respectively (Source: U.S. Census Bureau. American Fact Finder. Selected Housing Characteristics. 2007-2011 American Community Survey 5-Year Estimates. http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml. Natural gas: 74.1%, electricity: 24.1%, Others [liquefied propane, fuel oil, kerosene, wood, and other]: 1.8%. Assume 75% from natural gas and 25% from electricity); 4) Average annual electricity use and natural gas for heating per household: 2,283 kWh and 246 therms, respectively. Based on heating degree and cooling degree days information provided by ICLEI CAPPA (version 1.5). For Visalia region, based on fewer than 4000 heating degree days. ICLEI CAPPA version 1.5

was used to calculate annual energy savings. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

Year	Homes weatherized
2001	146
2002	102
2003	158
2004	72
2005	100
2006	142
2007	140
2008	92
2009	114
2010	167
2011	290
2012	290
Annual average	**151**

7. Urban Forestry

Assumptions used: 1) Total number of tree estimated to be planted between 2006-2020: 10,500 based on 750 trees/year on average (Source: Melissa Tracy, Parks & Urban Forestry, City of Visalia, 559.713.4384); 2) annual CO2 absorbed by one mature tree: 0.25 metric tons (Source: ICLEI CAPPA version 1.5 default value); 3) ICLEI CAPPA version 1.5 was used to calculate annual electricity savings and CO2 absorbed by trees. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

8. *Compact Fluorescent Lights (CFLs)*

Assumptions used: 1) the projected number of housing units in Visalia in 2020 was extrapolated from 2010 and 2030 figures provided in 2013 draft General Plan update (43,900 housing units in 2010, 60,200 housing units in 2020, 76,500 housing units in 2030); 2) 80% of the households would install at least 20 CFLs instead of incandescent bulbs by 2020.; 3) and by 2030, 50% of all households would replace 5 CFL bulbs with LEDs.

9. Sequoia National Park Shuttle Bus

Assumptions used: 1) Total number of shuttle buses the City currently has (as of March 2013): 12; 2) total number of additional shuttle buses City will be expecting to deploy/purchase from now till 2020: 10; 3) estimated number of buses that will retire by 2020: 6; 4) estimated number of annual miles driven by each shuttle bus: 13,320; 5) estimated average annual ridership: 7,041; 6) estimated number of miles round-trip: 122.2; 7) average number of passengers riding at one time: 12; 8) estimated fuel economy of shuttle bus: 6 miles/gallon of gasoline; 9) number of passengers in

one vehicle if no public shuttle service provided by City; 10) average passenger vehicle fuel economy: 25.9 (Source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy for cars.) Source for shuttle bus stats: Carmen Quevedo, City of Visalia, Transit. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

10. Bicycle Path Expansion

Assumptions used: 1) In 2005, the City of Visalia was utilizing the 1993 Bikeway Plan. This plan proposed increasing the miles of existing bikeway from 18.7 miles in 1993 to 85.7 miles in 2010. According to the February 2006 Bikeway Plan Update, there were 27.7 miles of the bikeway route network were existing (thus only 9 miles were added in actuality between 1993 and 2006) and a total proposed route network length of 140.0 miles (Source: Brandon Smith, Senior Planner, City of Visalia, bsmith@ci.visalia.ca.us, Phone: (559) 713-4636; March 2013). Therefore, based on most updated info provided by Mr. Smith, assume that in the beginning of 2006, there was a goal to expand 112.3 miles of bike path in Visalia; 2) City at the end of 2008 had about 27 miles of bike path. For long term plan, City plans to increase by another 117 miles. In 2008, Christine Chavez, Regional Planner, Tulare County Association of Governments, (559) 733-6291, ext 4894, chchavez@tularecog.org calculated estimated VMT miles reduced from adding 117 additional bicycle miles utilizing similar approach for calculating emissions for CMAQ projects = 59,130 VMT reduced. This estimation was used to calculate the estimated VMT reduced for the updated miles of bicycle path expansion stated above by Brandon Smith; 3) average passenger vehicle fuel economy: 25.9 (Source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy for cars). The same assumptions and sources were applied to quantify the GHG reductions through 2030.

11. Vi-Cycle Program

Assumptions used: 1) 2008-2012 bicycles distributed annually: 28; 2) assume program/similar program continues to be implemented through 2020 and program yields consistent results; 3) between 2006-2020, assume 367 bicycles distributed; 4) Weeks bikes used / year (May to Oct; assume 4 weeks in each month): 24; 5) Miles/week/bike: 2.5; 6) Annual VMT avoided: 21,996; 7) average passenger vehicle fuel economy: 25.9 (Source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy for cars). Source for Vi-Cycle Program: Nathan Garza, City of Visalia. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

12. Dare to Spare Program

Assumptions used: 1) 2012 Campaign stats: 543 miles walked and 699 miles biked by program participants; 2) assume program/similar program continues to be implemented through 2020 and program yields consistent results; 3) average passenger vehicle fuel economy: 25.9 (Source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy for cars). Source for program stats: Memo to City council dated April 3, 2013. Gamaliel Anguiano, GAnguiano@ci.visalia.ca.us. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

13. Increase in Transit Ridership (City Transit Buses)

Assumptions used: 1) Transit fixed route 2005 and 2012 annual ridership numbers: 1,184,088 and 1,737,093, respectively; 2) estimated number of miles per trip per passenger: 9.8 (Source: ICLEI CAPPA version 1.5 default figure); 3) average number of passengers riding at one time: 25; 4) estimated fuel economy of bus (CNG-miles per gge): 3.5; 5) number of passengers in one vehicle if no transit service provided by City: 1.59 (ICLEI CAPPA default number); 6) average passenger vehicle fuel economy: 25.9 (Source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy for cars). Source for program stats: Carmen Quevedo, City of Visalia, Transit. Note: City trolleys were not included in this analysis based on the fact that ridership between 2005 and 2012 decreased (2005: 96,135 and 2012: 31,537). The same assumptions and sources were applied to quantify the GHG reductions through 2030.

14. Traffic Light Synchronization

Assumptions used: 1) annual VMT on corridors where traffic synchronization will be implemented in Visalia in 2005: 121,330. Based on the following:

- Akers Street between Cypress Avenue and Caldwell Avenue: 29,240 vehicle miles
- Demaree Street between Campus Avenue and Caldwell Avenue: 36,340 vehicle miles
- Whitendale Avenue between Akers Street and County Center: 12,600 vehicle miles
- Caldwell Avenue between Akers Street and Santa Fe Street: 37,050 vehicle miles
- Mineral King & Noble Ave between Giddings St and West St.: 6,100 vehicle miles

Source: Rebecca Keenan, rkeenan@ci.visalia.ca.us, City of Visalia

Vehicle Fuel Type	Vehicle Type	% Vehicle type [3]	Vehicle Miles in Traffic Signal Corridor	Fuel Economy (Miles / Gallon) or (Miles/gallon of gasoline equivalent for CNG) [1]	Fuel Use Per Mile with Synchronization [2]	Fuel Saved Due to Synchronization (gallons)
Diesel	Heavy Duty Vehicles	2%	2,427	6.2	5.456	1,805.39
	Light Trucks	1%	1,577	18	15.84	3,406.95
	Passenger Vehicles	0.3%	364	25	22	1,091.97
Gasoline	Light Trucks	32%	39,265	16	14.08	75,388.47
	Passenger Vehicles	64%	77,651	21.7	19.096	202,203.72
CNG	Light Truck	0.04%	46	13.75	12.1	76.05

[1] - Information for Gasoline-powered vehicles from the EPA's 2011 Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2011 http://www.epa.gov/otaq/consumer/420f08024.pdf
- Information for CNG vehicles from 2005 community municipal inventory. The CNG from the 2005 community inventory is from municipal vehicle operations (2 vehicles specifically). The fuel economy of the two vehicles were averaged and used in this method.
- Information for diesel vehicles from http://www.fueleconomy.gov/feg/PowerSearch.do?action=Cars&path=3&year1=2012&year2=2014&vtype=Diesel&srchtyp=newAfv&pageno=1&sortBy=City&tabView=0&rowLimit=200, http://pubsindex.trb.org/view.aspx?id=909296

[2] Based on City of Apple Valley, CA's Climate Action Plan, which assumes that town-wide signal synchronization measure would increase fuel efficiency by 12%. Source: http://applevalley.org/Index.aspx?page=787
[3] % Breakdown of vehicle type adapted from ICLEI CACP 2009 software. Percentage of heavy duty vehicle was reduced to 2% from 5% (ICLEI CACP default figure) based on information received from Rebecca Keenan. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

15. Waste-to-Energy Program

Assumptions used: 1) 2005-2009 Visalia average tonnage/year sent to incineration: 1,416. The Waste to Energy Program began in 2005. Visalia did not send any waste to incineration in 2005. The City of Visalia belongs to the Consolidated Waste Management Authority, a joint powers authority (which includes seven cities and Tulare County), which ships refuse to be incinerated at a transformation facility at Long Beach. Since individual refuse breakdown by the Joint Powers Authority members are not available, Visalia's share of tonnage sent to incineration was calculated based on population distribution among the JPA partners for 2006-2009; 2) assume program continues to 2020. Source of tonnage incinerated by JPA: Anne Magaña, Consolidated Waste Management Authority-Administrator, (559) 713-4404, AMagana@ci.visalia.ca.us.

Year	JPA Tonnage	Estimated Visalia Tonnage
2005	672	0
2006	11,038	1,866
2007	12,437	2,128
2008	2931	821
2009	2923	848

16. Construction & Demolition Recycling

Assumptions used: 1) 2006-2011 Visalia average tonnage C&D: 9,191.47. Source: Anne Magaña, Consolidated Waste Management Authority-Administrator, (559) 713-4404, AMagana@ci.visalia.ca.us; 2) Assume the following debris type and percentage: metals – 2%, wood/lumber – 40%, cardboard – 8%. Based on following info: Construction of new 2000 ft^2 house produces 8000 lbs waste. 150 lbs metals, 3,000 lbs wood, 600 lbs cardboard, 1,000 lbs masonry. Source: http://www.toolbase.org/Best-Practices/Construction-Waste/residential-construction-waste. Via ICLEI's CAPPA tool version 1.5; 3) To be consistent with the 2005 inventory solid waste method, EPA WARM model (Feb 2012 update - online tool) was used to calculate the emissions reductions from C&D. Used "mixed metals", "dimensional lumber", and "corrugated containers" in the WARM model. Assumptions used for online calculator: LFG Recovery (flare) and zero distance for waste transport characteristics.
http://epa.gov/epawaste/conserve/tools/warm/Warm_Form.html. The emissions reductions represent reduction in emissions from changing disposal method from landfilling to recycling. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

Year	Tonnage
2006	8,123.00
2007	9,095.00
2008	10,973.00
2009	8,741.00
2010	8,688.00
2011	9,528.83
Annual average	**9,191.47**

17. Yard Waste/Food Scraps Composting

Assumptions used:

Year	Residential	Commercial	Total Yard Waste & Food Scrap (tons)
2012	30,013.29	1,045.32	31,058.61
2011	30,407.31	1,164.83	31,572.14
2010	30,382.19	637.32	31,019.51
2009	28,283.53	518.99	28,802.52
2008	30,449.72	392.44	30,842.16
2007	27,957.08	511.55	28,468.63
2006	30,187.54	429.49	30,617.03
2005	30,885.94	N/A	30,885.94
2004	24,729.85	N/A	24,729.85

The City of Visalia has had a yard waste collection service since 1985. The numbers in the table above reflect only yard waste that was delivered by City of Visalia to composters. The amounts do not include private haulers. Food scrap tonnage is comingled with yard waste. Source: Anne Magaña, Consolidated Waste Management Authority, CWMA Administrator, Office: (559) 713-440, amagana@ci.visalia.ca.us

	Residential [1]	Commercial [2]	Total Yard Waste & Food Scrap (tons)
Annual estimated tonnage of compost generated by Visalia in 2020	29,255	1,105	30,360.24
Annual estimated tonnage of compost generated by Visalia in 2020 that can counted toward GHG emissions reductions [3]	-	1,105	1,105

[1] Since tonnage of residential composting has remained relatively consistent throughout the years, assume same consistency through 2020.
[2] For the commercial sector, only utilized 2011 and 2012 averages since the program was piloted in 2009; allow a couple of years for the program to fully be implemented by community.
[3] Can only count commercial yard waste and food scrap tonnage generation toward 2020 emissions reductions since the program expansions happened after 2005 baseline year. Residential yard waste tonnage generation in 2005 cannot be counted toward emissions reductions since the program already existed in 2005. Additionally, for the residential sector, since the total amount of compost generated during the baseline (2005) and latest year (2012) has remained relatively the same, even with the implementation of food scraps service in 2009, assume no significant expansion in total compost collected from the residential sector in the future. Therefore, assume no emissions reductions from the residential sector in 2020.

Additional assumptions: 1) % composition of compost: 94.5% yard waste/plant debris and 5.5% food scrap (Source: Anne Magaña, Consolidated Waste Management Authority, CWMA Administrator, Office: (559) 713-440, amagana@ci.visalia.ca.us); 2) To be consistent with the 2005 inventory solid waste method, EPA WARM model (Feb 2012 update - online tool) was used to calculate the emissions reductions from composting yard waste (yard trimming) and food scrap. Assumptions used for online calculator: LFG Recovery (flare) and zero distance for waste transport characteristics. http://epa.gov/epawaste/conserve/tools/warm/Warm_Form.html. The emissions reductions represent reduction in emissions from changing disposal method from landfilling to recycling and composting. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

II. Existing Municipal Measures

1. Facility Lighting Upgrades (Convention Center Exhibit Hall, East Parking Structure, West Parking Structure), HVAC Upgrades, Plug load occupancy sensors: Annual energy savings based on March 2013 draft municipal Energy Action Plan developed by ESA.

2. Police Substations

Assumptions used: 1) energy savings (kWh and therms) obtained from SCE reporting provided by Leslie Caviglia, City of Visalia. Northside and Southside each show kWh savings of 5,872, but a therm usage of 25. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

3. Lighting and Equipment Upgrades (California Energy Commission Loan)

Assumptions used: 1) Estimated kWh and therms savings based on energy audits prepared by BASE Energy, Inc. in 2011 and 2012. The upgrades are planned to be implemented in Q3 2013 through a $500,00 California Energy Commission loan. Source: Betsy McGovern-Garcia, City of Visalia. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

4. LED Traffic and Pedestrian Lights

Energy savings based on December 2010 Southern California Energy incentive report. Provided by Betsy McGovern-Garcia, City of Visalia. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

5. Water Pump Upgrades

Assumptions used: Two pumps upgraded. 1) Water pump was upgraded and is identified as Plant 40995, Location: Ave 280 Walnut Pump, Service Account #: 025-2237-96, Meter #: 3416M-8656. Estimated annual kWh savings: 27,831. Source: SCE incentive report from August 31, 2012; 2) The City's Parks and Recreation department upgraded a water pump for the Valley Oaks Golf Course. The energy savings from this upgrade is estimated to be 2,539 kWh/year; cost savings are estimated at $393/year. Source: March 2013 draft municipal Energy Action Plan. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

6. Airport – Solar PV

Assumptions used: 1) 30 kW solar PV installed at airport; 2) sun hours per day: 4.5; 3) annual energy production calculated using ICLEI CAPPA.

7. Bus Shelters – Solar PV

Assumptions used: 1) 2.04 kW cumulative solar PV installed at bus shelters based on 51 solar bus stops and each system size 40W; 2) sun hours per day: 4.5; 3) annual energy production calculated using ICLEI CAPPA.

8. Transit Center – Solar PV

Assumptions used: In 2011, a second solar PV system (5,060 W) was installed on the canopy of the bus shelter waiting area in the Transit Center. Funding was obtained from FTA-ARRA Grant. A 4.7 kW system was installed on the roof of the Transit Center in 2003. Only the recently installed solar system will be taken into account in the CAP since the first system was installed prior to 2005. 30 kW solar PV installed at airport; 2) sun hours per day: 4.5; 3) annual energy production calculated using ICLEI CAPPA.

9. Water Conservation Plant Renewable Energy Systems – Solar PV and Microturbines

Energy savings for microturbines is based on Draft EIR report developed by ICF International. September 2011. Page 3E-9. Provided by Betsy McGovern-Garcia, City of Visalia. The 1 MW solar PV was calculated using the Clean Power Estimator: http://www.gosolarcalifornia.com/tools/clean_power_estimator.php. Assumptions used: 1.0 MW ac PV system; Tilt at 30 degree; south orientation; -10% output adjustment.

10. CNG Solid Waste Trucks

Assumptions used: 1) Total # of new CNG trucks the City deployed between beginning of 2005 to now (March 2013): 40; 2) Estimated total # of additional CNG trucks projected to be deployed between now and 2020: 15; 3) Estimated # of vehicles that will retire by 2020: 31; 4) Total # of CNG trucks by 2020 post-2005: 24; 5) CNG truck fuel economy (mpg-diesel equivalent): 2.3; 6) Diesel truck fuel economy (mpg): 3; 7) Average Annual Miles per Vehicle: 10,000. Source of truck stats: Mike Morgantini, Fleet Manager, City of Visalia. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

11. CNG Dial-A-Ride Buses

Assumptions used: 1) Total # of new DAR buses the City deployed between beginning of 2005 to now (March 2013): 12; 2) Estimated total # of additional DAR buses projected to be deployed between now and 2020: 7; 3) Estimated # of DAR buses that will retire by 2020: 8; 4) Total # of CNG DAR buses by 2020: 11; 5) CNG DAR bus fuel economy (mpgge [gasoline equivalent]): 7.5; 6) Gasoline bus fuel economy (mpg): 10; 7) Average Annual Miles per Vehicle: 14,821. Source of vehicle stats: Carmen Quevedo, City of Visalia, Transit. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

12. CNG Transit Buses

Assumptions used: 1) Total # of new transit buses the City deployed between beginning of 2005 to now (March 2013): 24; 2) Estimated total # of additional transit buses projected to be deployed between now and 2020: 12; 3) Estimated # of buses that will retire by 2020: 12: 4) Total # of CNG transit buses by 2020: 24; 5) CNG transit bus fuel economy (mpgge): 3.5; 6) Diesel bus fuel economy (mpg): 4.75; 7) Average Annual Miles per Vehicle: 55,408. Source of vehicle stats: Carmen Quevedo, City of Visalia, Transit. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

13. CNG Trolleys

Assumptions used: 1) Total # of new trolleys the City deployed between beginning of 2005 to now (March 2013): 3; 2) Estimated total # of additional trollies projected to be deployed between now and 2020: 3; 3) Estimated # of vehicles that will retire by 2020: 3; 4) Total # of trolleys by 2020 post-2005: 3; 5) CNG trolley fuel economy (mpgge): 3; 6) Diesel trolley fuel economy (mpg): 6.5; 7) Average Annual Miles per Vehicle: 9,525. Source of vehicle stats: Carmen Quevedo, City of Visalia, Transit. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

14. Hybrid Electric Sedans

Assumptions used: 1) Total # of new hybrid electric sedans the City deployed between beginning of 2005 to now (March 2013): 26; 2) Estimated total # of additional hybrid electric sedans projected to be deployed between now and 2020: 22; 3) Estimated # of vehicles that will retire by 2020: 0; 4) Total # of hybrid electric sedans by 2020: 48; 5) Hybrid electric sedans fuel economy (mpg): 32; 6) Gasoline sedan fuel economy (mpg): 19.7; 7) Average Annual Miles per Vehicle: 12,000. Source of vehicle stats: Mike Morgantini, Fleet Manager, City of Visalia. Source of gasoline sedan fuel economy: ICLEI CAPPA version 1.5. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

APPENDIX D.2. – CITY OF VISALIA GENERAL PLAN UPDATE

Below is a list of relevant objectives and specific policies in the draft General Plan that address long-term GHG emissions reduction efforts by the City.

Below is a list of relevant objectives and specific policies in the draft General Plan that address long-term GHG emissions reduction efforts by the City.

1. Category: GROWTH MANAGEMENT/INFILL/DENSITY INCREASE

OBJECTIVE OR POLICY NO.	DESCRIPTION
LU-O-9	Growth Management/Infill
LU-P-19	Concentric Growth Rings/ Compact Growth
LU-P-24	Periodically Adjust Land Demand Projections
LU-O-13	Compact Growth, No Leapfrog Development
LU-O-18	Infill Incentives
LU-P-44 & 45	Incentives for Density Increases
LU-O-19	Target Residential Density 5.3du/ac Going Forward
LU-O-22	Multi-density Residential Neighborhoods
LU-O-31	Downtown Development/Vitality
LU-P-66	Revise Neighborhood Commercial zone standards and preserve limited locations criteria
LU-P-72 & 73	Revitalize Downtown and East Downtown (EDT) as highly urbanized City core
LU-P-74	Incentivize Infill Sites
LU-P-75	CIP to Connect EDT Streets Into Block Pattern
LU-P-83 & 85	Master Vision for EDT – Highly Urbanized/Mixed Use

2. Category: MIXED USE/ WALKABLE NEIGHBORHOODS/REDUCED VMT

OBJECTIVE OR POLICY	DESCRIPTION
LU-O-14, 15 & 16	Create Walkable Neighborhoods

LU-P-52	Promote Mixed-Use and Multi-family Developments
LU-O-27	Promote office developments as employment hubs near residential
LU-O-28	Promote walkability into retail and mixed use projects
LU-P-60	Support infrastructure upgrades for five identified transit corridors
LU-P-62 and -63	Pedestrian amenities for higher intensity and mixed use projects; Provide incentives for pedestrian-friendly and mixed use developments
LU-P-64 & 68	Require Master Planning of Regional and Community Commercial zoned projects
LU-P-65	Add Mixed-Use as a distinct Zone in the ZC Update
LU-P-77	Pedestrian features in EDT projects
LU-P-80 & 95	Build shared parking facilities in EDT
LU-P-89	Promote increased mixed use in Downtown
LU-P-100	Allow secondary daily needs goods and services in Industrial uses and developments
LU-P-108	Promote a compact mixed use village supporting College of the Sequoias (COS)
PSCU-O-6	Coordinate for joint use facilities
PSCU-P-1	Master plan parks to be co-located with schools, in detention basins, and use water efficient landscape
PSCU-P-6	Neighborhood parks to be sited to be walkable from the area they serve
PSCU-O-8	Elementary schools to be at the core of new neighborhoods
PSCU-O-9	Coordinate siting of new schools at optimal locations and needs timing

3. Category: ENERGY AND RESOURCES EFFICIENCIES & AIR QUALITY

OBJECTIVE OR POLICY	DESCRIPTION
LU-P-38	Minimize heat gain through site design
PSCU-O- 14	Adopt water use Best Mngt. Practices (BMP)
PSCU-P-44	City to participate in Water Conservation Program, featuring education and grey

	water re-use
PSCU-P-45	City to take active role in regional and local water mngt. Planning, incld.- acquiring water rights, ground water recharge, water recycling
PSCU-P-46, 47	Adopt City version of WELO
PSCU-P-49	Industrial developments to include water recycling & conservation in design
PSCU-P-50	City Building Inspectors to be trained to inspect CalGreen Code standards
AQ-O-3	Reduce GHG
AQ-P-6	Amend City tree ordinance to encourage use of pollution absorbing species
AQ-P-7	Participate in Regional Spare the Air program
AQ-P-8	Minimize drive-thrus
A-QP-9	Mitigate short and longterm construction impacts using BMP standards
AQ-P-11	TCM to reduce vehicle travel
AQ-P-16	Prepare and adopt a CAP

4. Category: <u>FACILITATE ALTERNATIVE TRANSPORTATION MODES</u>

OBJECTIVE OR POLICY	DESCRIPTION
T-O-8, 9, & 10	Encourage biking and walking
T-O-11	Promote and accommodate wheelchair mobility
T-P-39	Develop three Tier bike trail system
T-P-41	Integrate bike facilities into development projects
T-P-45, 46, &46	Ensure for bikeway connectivity
T-P-51	Ensure for sidewalk connectivity to all schools
T-P-52	Provide “pass-thru” access points in subdivisions

5. Category: <u>PROMOTE TRAFFIC EFFICIENCY</u>

OBJECTIVE OR POLICY	DESCRIPTION
T-O-3	Reduce peak hour trips and VMT
T-P-1	Design “Complete Streets”
T-P-2	Use signal timing and roundabouts to increase intersection efficiency
T-P-8	CIP priority to “complete streets” and

	correcting deficiencies
T-P-13	Acquire ROW in older areas to provide connectivity
T-P-14	Require stubout streets for adjacent future project connections
T-P-19	Pursue Transportation Systems Management (TSM)
T-P-20	Work with major employers on Traffic Demand Management (TDM) vehicle reduction programs
T-P-24	New developments to pay for offsite improvements when needed to maintain LOS D
T-P-53	Develop flexible parking standards

6. Category: ALIGN LOCAL & REGIONAL LAND USE AND TRANSPORTATION POLICIES

OBJECTIVE OR POLICY	DESCRIPTION
T-P-68	Design bus rapid transit (BRT) to City of Tulare
T-P-69	Support and connect to future High Speed rail (HSR) station
T-P-77	Participate in development of Regional Transportation Plan (RTP) & Sustainable Growth Strategies, coordinate with new City Land Use and Circulation Elements

APPENDIX E.1. – PROPOSED MEASURES ONLINE SURVEY

City of Visalia New Measures Survey

1. Introduction

On the following 3 pages you will be asked to rate measures the City could take to reduce greenhouse gas emissions, as well as provide some input on the criteria the city should use to evaluate potential measures.

We are asking for this input because as City managers and involved citizens of the City, you are in an excellent position to give us insights into the actions that are important and effective.

This survey should only take about 5 minutes of your time.

If you have any questions or comments, please feel free to call/email me
Eun-Soo Lim
(415) 507-1430
eun-soo@seiinc.org

Thank you for helping us identify the actions most suitable for the City to take to reduce greenhouse gas emissions!

2. Decision Criteria

1. Please rank the importance of each of the following criteria for evaluating possible greenhouse gas reduction measures from 1 (most important) to 6 (least important).

	1 (most important)	2	3	4	5	6 (least important)
Initial implementation cost	◯	◯	◯	◯	◯	◯
Operation and maintenance costs	◯	◯	◯	◯	◯	◯
Financial return on investment	◯	◯	◯	◯	◯	◯
Implementation timeframe	◯	◯	◯	◯	◯	◯
Level of effort required by local government staff	◯	◯	◯	◯	◯	◯
Degree of implementation control held by local government	◯	◯	◯	◯	◯	◯

3. Community Measures

Based on your knowledge of **community activities**, for each impact area below, please rate the possible measure types in terms of both **importance** for reducing greenhouse gas emissions and **effectiveness** in terms of the city's ability to use the measure to realize emission reduction goals.

Note: *You do not need to rate every measure. If you have no opinion about the importance of a particular measure, you can skip it. But please provide feedback on as many measures as you can so we get as full a picture as possible.*

City of Visalia New Measures Survey

1. Increasing Energy Efficiency, use of renewable, green building practices

	Importance	Effectiveness
Provide incentives (technical assistance, fee waivers, recognition programs, etc).		
Institute ordinances or policies (green building standards, equipment requirements, etc.)		
Launch educational campaigns for residents and businesses		
Establish financing program (e.g. revolving loan funds through bonds, energy taxes, etc.)		
Facilitate Community Green Power purchasing options (green tags, offsets, etc.)		

Other (please specify)

2. Reducing Transportation emissions, increasing use alternative transportation options

	Importance	Effectiveness
Institute Ordinances or policies (feebates for parking, no idle policy, miniumum parking requirements, telecommuting, business-sponsored parking cash-out programs)		
Provide incentives (reduced parking fees, bus pass programs, telecommute credits, etc.)		
Establish Education/Service system (sells transit passes, coordinate car pools, provides educational materials)		
Build alternative fuel infrastructure (e.g. CNG, ethanol, biodiesel, electric vehicle charging station, etc.)		

Other (please specify)

3. Conserving Water

	Importance	Effectiveness
Promote installation of water efficient plumbing equipment (e.g. low-flow faucets, shower heads, toilets)		
Promote use of low-maintenance and low-water demand landscaping		

Other (please specify)

City of Visalia New Measures Survey

4. Changing land use patterns

	Importance	Effectiveness
Establish zoning or land use policy changes (promote infill, high-density, and transit-oriented development)		
Provide development incentives/disincentives (density bonuses, permit waivers, impact fees, mitigation fees)		

Other (please specify)

5. Reducing waste

	Importance	Effectiveness
Establish a ReUse center (for salvage, resale etc.)		
Provide financial incentives (special taxes, tipping fees variations, etc.)		

Other (please specify)

6. Please provide us any other comments that you may have. Thank you!

4. Municipal Measures

Based on your knowledge of **City operations**, for each impact area below, please rate the possible municipal measure types in terms of both **importance** for reducing greenhouse gas emissions and **effectiveness** in terms of the city's ability to use the measure to realize emission reduction goals.

Note: *You do not need to rate every measure. If you have no opinion about the importance of a particular measure, you can skip it. But please provide feedback on as many measures as you can so we get as full a picture as possible*

City of Visalia New Measures Survey

1. Increasing Energy Efficiency, use of renewable, green building practices

	Importance	Effectiveness
Institute energy efficiency and green building standards for renovations and new construction of municipal buildings		
Deploy more renewable energy systems (PV, Geothermal, solar thermal)		
Institute energy conservation policies (lights out at night, computer sleep modes, temperature setbacks)		
Audit and upgrade lighting and HVAC systems (e.g. LED exit signs and street lights, occupancy sensors, boilers, chillers, etc.)		
Develop procurement policies (energy efficiency standards in purchasing and bid specs for office equipment, lighting, etc.)		
Set "green power" requirements for municipal buildings (purchased from local utility or through green tags)		

Other (please specify)

2. Reducing Transportation emissions, increasing use alternative transportation options

	Importance	Effectiveness
Optimize fleet (retire old under-used vehicles, rightsize vehicles, purchase high efficiency vehicles, purchase alternative fuel vehicles, etc.)		
Develop alternative transport infrastructure (provide fueling / charging stations, bike lockers, showers, etc.)		
Develop alternative transport programs (police bikes, shared bikes for intra-building use access, trip scheduling, telecommute options).		
Implement new fleet policies (no idling, high efficiency purchase requirements)		
Improve maintenance regimes (e.g. check tire pressure, filter cleaning, performance evaluations)		
Provide incentives (subsidized transit passes, elimination of free parking, preferred parking for carpools, vanpools, etc.)		

Other (please specify)

APPENDIX E.2. – QUANTIFICATION OF PROPOSED MEASURES

This section provides detailed information, including assumptions and inputs for ICLEI's CAPPA (version 1.5) that were used to calculate the energy savings of the proposed measures. Unless noted below, the default figures provided in the CAPPA tool were utilized for the calculations. The calculated energy savings were then translated into emissions reductions using ICLEI's CACP software to ensure the emissions factors were as accurate as possible (ICLEI's CAPPA does not provide utility specific emission factors). The emission factors used in the CACP software for the proposed measures include the latest information available from the Local Government Operations Protocol (version 1.1, 2011). For electricity use, Southern California Edison's latest available (2007) emission factor for CO2 and the latest California emission factors for CH4 and N2O (2007) were utilized from the Local Government Operations Protocol.

I. Proposed Community Measures

1. ENERGY STAR Appliances & Equipment

Residential Sector equipment & appliances: To calculate energy savings, the projected number of housing units in Visalia in 2020 was extrapolated from 2010 and 2030 figures provided in 2013 draft General Plan update (43,900 housing units in 2010, 60,200 housing units in 2020, 76,500 housing units in 2030). Assumptions made: 1) each housing unit had at least one clothes washer, dish washer, and refrigerator; 2) 10% of the housing units already has energy efficient equipment (e.g. ENERGY STAR); 3) Of the 90% remaining, 25% of housing units would purchase Energy Efficient equipment by 2020. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

Commercial/Industrial Sector equipment & appliances: To calculate energy savings, known data of Commercial/Industrial Businesses operating within Visalia (4,626 total businesses in 2013; 5,277 total businesses estimated in 2020) was used. Assumptions made: 1) each business had at least one computer, one monitor, one printer and one copier; 2) 10% of businesses already has energy efficient equipment (e.g. ENERGY STAR); 3) 25% of the remaining 90% would purchase Energy Efficient equipment by 2020. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

2. Community-wide Solar PV Bulk Purchasing

City goal for this measure: 300 kW capacity through community bulk purchasing by 2020. Based on following case studies:

Case study 1: Salt Lake Community Solar (SLCS) is an innovative community bulk-purchase solar initiative overseen by Utah Clean Energy, a local non-profit organization, and a volunteer Steering Committee designed to help homeowners in Salt Lake County overcome the logistical and financial hurdles of going solar. Their final total is in: 64 households in Salt Lake County committed to going solar, resulting in a capacity of 232 kW of solar energy. Source: http://mycommunitysolar.org

Case study 2: Solarize began as a grassroots movement in Portland, Oregon. Over the last three years, Solarize programs have helped the city add more than 1.7 MW of distributed PV and establish a strong, steady solar installation economy. The Portland model is so successful that

communities in Arizona, Colorado, Washington, Massachusetts, Vermont, California, and others have established their own programs to buy PV in bulk and share the savings among participants. Even multi-city campaigns have followed the Solarize model. Companies are also taking part in Solarize campaigns to provide employees group-purchasing discounts that make solar PV more affordable. To date, Solarize campaigns have resulted in 1,960 installations throughout the United States. Source:
http://transformgov.org/en/Article/102291/Power_in_NumbersPopular_Community_Movements_Make_Solar_PV_More_Accessible

Case studies range from 232 kW to 1.7 MW of solar PV capacity. Assume a conservative goal of 300 kW solar capacity achieved through community-wide bulk purchasing in 2020 in Visalia.

3. Property Assessed Clean Energy (PACE) Program

Assumptions used: 1) Average kWh savings per PACE application and average number of PACE applications per year were based on calculations from cities of similar size and location to Visalia (the cities of Corona and Murrieta) that have tracked savings from their own PACE Programs. Those calculations were used as a proxy for expected kWh savings per PACE application and number of applications annually within the City of Visalia. (Source: Western Riverside COG's PACE Program Weekly Summary - 11/10/2013). 2) Assume a one-year delay of program (to start in 2014), based on California Governor Jerry Brown's proposal.

4. Energy Efficieny Marketing & Programs

Assumptions used: 1) 5% of all households within Visalia would achieve 5% reduction in kWh usage, due to the Energy Efficiency Marketing and Outreach work of the View Partnership continuing education program. 2) Investor-Owned Utility Public Goods Charge funded programs, such as Energy Upgrade, Home Tune-Up, and Direct Install, would result in a 25% reduction in kWh usage within 10% of Visalia businesses by 2030, and a 10% reduction in kWh usage within 25% of Visalia households by 2030. 3) The Visalia Unified School District (VUSD) will receive approximately $1.5million in California Proposition 39 funding for each of the next five years. The City of Visalia will actively court and help VUSD to leverage resources for Proposition 39 readiness and planning, thereby helping them to increase the cost-effectiveness of Proposition 39-funded projects. Such initiatives that will help districts to most effectively capitalize on the Proposition 39 opportunity include student/youth conservation training and engagement, retrofit and retro-commissioning training for VUSD facilities staff, and leveraging utility program incentives and rebates (source: Energize Schools Program: http://www.energizeschools.org).

5. Visalia Unified School District (VUSD) Solar Program

Assumptions used: 1) Based on the RFP for phase 1, Visalia USD will install solar shade structures at 13 schools that will produce 3,298,015 kWh of electricity; 2) For phase 2, Visalia commits to installing equal capacity of phase 1 by 2020; 3) ICLEI's CAPPA tool 1.5 was utilized to calculate emissions reductions.

6. Water Efficient Landscaping Policy

Assumptions used: 1) Measure water reduction goal based on Cal Water's goal. Cal Water has the state-mandated target of decreasing per capita consumption by 20% by 2020; 2) estimated 2020 Visalia population: 167,859 based on 2013 draft General Plan update; 3) estimated current annual

per capita water use in Visalia: 83,220 gallons/year based on 228 gallons (2009 figure) from August 5, 2010 Visalia draft General Plan Update by Dyett & Bhatia (http://www.visaliageneralplanupdate.com/pdf/Visalia_EC_Executive_Summary-low.pdf); 4) Percentage water from outdoor use: 54% (Source: Outdoor Residential Water Use, Appendix B, Table B-2: Estimating Outdoor Water Use: Hydrologic Region Method. Based on Tulare Lake Hydrologic Region. http://www.pacinst.org/reports/urban_usage/appendix_b.pdf.

7. Water Efficiency Landscaping Promotion and Education

Assumptions used: 1) Measure water reduction goal: 10% by 2020; 2) estimated 2020 Visalia population: 167,859 based on 2013 draft General Plan update; 3) estimated current annual per capita water use in Visalia: 83,220 gallons/year based on 228 gallons (2009 figure) from August 5, 2010 Visalia draft General Plan Update by Dyett & Bhatia (http://www.visaliageneralplanupdate.com/pdf/Visalia_EC_Executive_Summary-low.pdf); 4) Percentage water from outdoor use: 54% (Source: Outdoor Residential Water Use, Appendix B, Table B-2: Estimating Outdoor Water Use: Hydrologic Region Method. Based on Tulare Lake Hydrologic Region. http://www.pacinst.org/reports/urban_usage/appendix_b.pdf. Assume majority of outdoor use is from landscaping).

8. Transit-Oriented Development (TOD)

Assumptions used: 1) Measure goal: 10% of new housing is built to foster TOD; 2) The number of residential units in TOD is assumed to be 1,630. This is based on the estimated increase in number of new housing units from 2010 to 2030. 43,900 housing units in 2010 and 76,500 housing units to be expected in 2030 (Source: 2013 draft General Plan Update). 2020 new housing development (60,200) was extrapolated from 2010 and 2030 figures. Equals 16,300 total new housing development between 2010 and 2020; 3) Inputs included 4,770 annual reduction in vehicle miles per person as a result of TOD (ICLEI CAPPA default value); and 4) an average passenger vehicle fuel economy of 25.9 mpg (Source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy for cars). The same assumptions and sources were applied to quantify the GHG reductions through 2030.

9. Electric Vehicle Penetration

Assumptions used: 1) The number of electric vehicles (EV) on the road in the Souther California Edison (SCE) territory is assumed to be 450,000 in 2020, and 2,266,549 in 2030. Based on the population percentage that the City of Visalia has compared to the population of the SCE territory, the total number of EVs in Visalia in 2020 is assumed to be 4,082 and 20,561 in 2030 (Source: SCE: Your Partner in Preparing for Electric Vehicles, https://www.sce.com/wps/wcm/connect/d8a9d377-a306-4d67-b178-16a87024d9d7/PEV__Business_YourPartner.pdf?MOD=AJPERES); 2) the growth rate of EV vehicles in Visalia was based on the number of EVs in 2015 (100,000) and in 2020 (450,000) (Source: SCE: Your Partner in Preparing for Electric Vehicles, https://www.sce.com/wps/wcm/connect/d8a9d377-a306-4d67-b178-16a87024d9d7/PEV__Business_YourPartner.pdf?MOD=AJPERES); 3) the average annual miles per vehicle (21,424) was based on the average in 2013 for passenger vehicles, light trucks and medium trucks (Source: http://www.ngvc.org/pdfs/driving-natural-gas-report.pdf); 4) the 25.9 fuel economy is based on EPA estimates (SOURCE: U.S. EPA Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy cars); 5) CO2e emissions from all EV in Visalia was sourced from CAPPA 1.5; 6) 25%of EV growth was attributed to Visalia CAP measures, and 75% was attributed to California Select State measures

(Source: attribution assumptions were provided by Visalia Conservation Resource Analyst, Betsy McGovern-Garcia (11/06/13).

Assumptions used: 1) 6 new charging stations in Visalia; 2) miles per gallon of vehicle replaced: 25.9. Based on an average passenger vehicle fuel economy of 25.9 mpg. (Source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy for cars); 3) estimated vehicle miles resulting from use of charging stations: 54,750/yr. This information is based on the following [1] Assume Level 2 charging stations are installed in the 6 charging stations in Visalia (read below for explanation of Level 2 charging station); [2] Assume Level 2 charging stations add about 15 miles of range per hour of charging time (mid-range between 10-20 miles reported); [3] Assume charging stations are available 24/7; [4] Assume charging stations are used during day time every hour between 8am-6pm in 2020 (10 hours/day). 10 hours/day x 365 days = 3,650 hours/year. Based on the assumption that each hour adds 15 miles of range, 3,650 hours of charging = 54,750 miles.

Charging equipment for plug-in hybrid electric vehicles (PHEVs) and all-electric vehicles (EVs) is classified by the rate at which the batteries are charged. Charging times vary based on how depleted the battery is, how much energy it holds, the type of battery, and the type of EVSE. The charging time can range from 15 minutes to 20 hours or more, depending on these factors.

Level 1 Charging - Level 1 EVSE provides charging through a 120 volt (V) AC plug and requires electrical installation per the National Electrical Code. Most, if not all, PEVs will come with a Level 1 EVSE cordset so that no additional charging equipment is required. On one end of the cord is a standard, three-prong household plug (NEMA 5-15 connector). On the other end is a J1772 standard connector (see the Connectors and Plugs section below), which plugs into the vehicle. Level 1 is typically used for charging when there is only a 120 V outlet available. Based on the battery type and vehicle, Level 1 charging adds about 2 to 5 miles of range to a PEV per hour of charging time.

Level 2 Charging - Level 2 equipment offers charging through 240 V (typical in residential applications) or 208 V (typical in commercial applications) electrical service. Level 2 EVSE requires installation of home charging or public charging equipment and a dedicated circuit of 20 to 80 amps, depending on the EVSE requirements. This charging option can operate at up to 80 amperes and 19.2 kW. However, most residential Level 2 EVSE will operate at lower power. Many such units operate at up to 30 amperes, delivering 7.2 kW of power. These units require a dedicated 40 amp circuit. Most homes have 240 V service available, and because Level 2 EVSE can easily charge a typical EV battery overnight, this will be a common installation for homes. Level 2 equipment also uses the same connector on the vehicle as Level 1 equipment. Based on the battery type and circuit capacity, Level 2 adds about 10 to 20 miles of range per hour of charging time, depending on the vehicle.

Source: http://www.afdc.energy.gov/fuels/electricity_infrastructure.html

10. Local, Low-Carbon Transportation Education

Assumptions used: 1) Number of households in Visalia in 2020: 53,750. Extrapolated from 2010 and 2030 figures provided in 2013 draft General Plan Update (2010: 41,500 and 2030: 66,000); 2) Measure goal – percentage of households who take action/impacted by education: 10%; 3) average VMT per household: 17,213 (ICLEI CAPPA default value); 4) 2020 Visalia community VMT calculated based on California VMT annual percentage increase from 2005 to 2020 (from GHG

emissions projections calculations). California VMT source: CEC. http://www.energy.ca.gov/2007publications/CEC-600-2007-009/CEC-600-2007-009-SF.PDF. table 4 page 12; 5) percentage reduction in vehicle miles: 8% (ICLEI CAPPA default value); 6) miles per gallon of vehicle replaced: 25.9. Based on an average passenger vehicle fuel economy of 25.9 mpg. (Source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy for cars). The same assumptions and sources were applied to quantify the GHG reductions through 2030.

11. Infill and Higher Density Development

Assumptions used: 1) The Visalia 2030 General Plan Measures for Infill and Higher Density Development include Enhanced Connectivity, Complete Streets, Increased density (compact development) and the correlating preservation of open space and reduced VMT, the promotion of infill development through an Infill Incentive Program, and the enablement of multi-family development close to transportation. 2) The calculation methodology for quantifying the GHG emissions reductions from avoided VMT from Infill and Higher Density Development was baced on that used for RICAPS San Mateo (Source: http://www.smcenergywatch.com/countywide_climate_action.shtml).

12. CNG Public Fueling Stations

Assumptions used 1): There are 0.84 vehicles for each of the 107,550 people in Visalia; 2) CNG makes up 0.04% of Visalia's community's vehicle portfolio; 3) 10% growth rate of CNG vehicles based on the growth rate of therms; 4) 31 miles per gallon for CNG vehicles; 5) 25.9 miles per gallon for vehicles replaced; 6) 21,424 average annual miles per vehicle; 7) Added Visalia CNG school bus consumption assuming operation 9 months per year; 8) Used CACP 2009 software to calculate GHG emissions savings.

13. Anaerobic Digestion

Assumptions used: 1) For the calendar year 2012, 31,058.61 tons of organic waste was composted in Visalia, 100% of which will be diverted to one of two anaerobic digesters (operated by Harvest and Wood Industries) by the year 2020; 2) Growth rates were applied to the compost tonnage to account for population growth through the years 2020 and 2030; 3) 5% of waste is diverted from landfill to the anaerobic digester; 4) 100% of biogas produced by the Wood Industries anaerobic digester will be used to produce electricity; 5) 100% biogas produced by the Harvest anaerobic digester will be used to produce CNG.

II. Proposed Municipal Measures

1. ENERGY STAR Appliances & Equipment

Assumptions used: The City currently has a total of 30 non-ENERGY STAR refrigerators (commercial and residential-style). Data based on April 26, 2013 information except for the Fire Department. For the Fire Department, 2009 info was used; 91 non-ENERGY STAR computers; and 7 non-energy efficient vending machines. Source: City of Visalia staff.

2. SCE-Owned Streetlight Retrofit

Assumptions used: 1) Total streetlights in Visalia currently: 6,877; 720 City owned; 6,157 SCE owned; 2) Current annual electricity used for SCE streetlights: 2,390,982 kWh. Electricity price: $0.35/kWh; and 3) Assume all SCE-owned streetlights retrofitted to LED lights by 2020. Source: City of Visalia staff. The same assumptions and sources were applied to quantify the GHG reductions through 2030.

3. Solar Photovoltaic (PV)

Assumptions used: 1) In 2006, the City installed a 30 kW solar PV system at the Visalia Airport. In 2011, a second solar PV system (5,060 W) was installed on the canopy of the bus shelter waiting area in the Transit Center. Funding was obtained from FTA-ARRA Grant. A 4.7 kW system was installed on the roof of the Transit Center in 2003. At the Water Conservation Plan, a 1MW of solar PV will be installed in the near future as part of the WCP upgrade. Assume City will make it a goal to add at least another 750 kW of solar by 2020, and an additional 1.5 MW between 2020 and 2030; 2) Price of electricity: $0.15/kWh; 3) sun hours per day: 4.5, 4) cost of PV installations: $7,800/kW based on an average size system of 5-100 kW, especially since most installations are residential size (price based on menu of options provided in ICLEI CAPPA).

4. Procurement of Smaller/Higher Fuel Efficiency Vehicles

Assumptions used: 1) Emissions reduction based on procurement of 15 smaller vehicles. Source: based on 2005 municipal GHG emissions inventory; 2) small vehicle miles per gallon: 29 and miles per gallon of vehicle replaced (Source: ICLEI CAPPA default figure); and 3) miles per gallon of vehicle replaced: 25.9. Based on an average passenger vehicle fuel economy of 25.9 mpg (Source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2011. Table 1 page 9. Based on 2011 fuel economy for cars).

APPENDIX E.3. – OPTIONAL FUTURE MEASURES LIST[79]

1. Community-Scale Measures

Residential Energy Measures

- Building codes
  - Energy efficiency standards for new construction or major renovations
  - Requiring light colored, high albedo rooftops/pavement
- Ordinances for energy efficient retrofit in existing building stock at time of sale
- Solar access ordinances
- Solar hot water/pool heating and solar PV applications, ordinance, or incentives
- Green building design incentives, guidelines, or ordinances
- Passive solar design and solar orientation incentives, guidelines, ordinances
- Financial incentives (e.g., tax incentives, rebates, loans) for:
  - Installation of PV, other renewable energy application
  - More efficient appliances, e.g. refrigerators, lighting, water heaters
  - Improving efficiency in existing and new buildings
- Home insulation or weatherization programs
- Distribute water saving devices, such as low-flow showerheads and faucet aerators

Commercial Energy Measures

- Building codes
  - Raising energy efficiency standards for new construction, significant renovations, remodeling, additions
  - Requiring light colored, high albedo rooftops and pavement
- Green building design incentives, guidelines, or ordinances
- Ordinance for energy efficient retrofit in existing building stock at time of sale
- Solar access ordinance
- Provide energy services to business, e.g. audits, assessments for energy efficiency improvements, other technical assistance
- Cooperative or aggregate purchase or buyer program for lighting, efficient equipment
- Lower business fees or waive permits for energy efficiency improvements and use of solar energy
- Building Energy Tax Credit

Industrial Energy Measures

- Ordinances establishing energy efficiency requirements for new industrial permits
- Ordinances requiring industries to develop and implement energy conservation programs
- Ordinances lowering business fees or waiving permits for energy efficiency improvements and fuel switching (including use of solar energy), heat recovery/co-generation systems
- Provide energy services to industry, e.g. audits, assessments to recommend process changes, other energy efficiency improvements

[79] Source: ICLEI's Cities for Climate Protection Milestone Guide.

Financing Energy Efficiency

- Establish financing program for efficiency improvements in the community, e.g. revolving loan funds through bonds, energy taxes, etc.

Transportation Measures

- Increase use of alternative transit—public transit, van-, carpooling, cycling, walking through:
    - Funding for facility, system and/or infrastructure improvements
    - Dedicated lanes for transit/HOV vehicles
    - Ordinance providing parking fee and road toll discounts for van- and car-pools
- Establish service center selling transit passes, coordinating car/van pooling, ridesharing, etc.
- Trip Reduction Ordinance or policies requiring or promoting programs to encourage use of transit, ridesharing, telecommuting, business-sponsored parking cash-out programs
- Establish or facilitate road tolls to decrease motor vehicle use
- Parking policies:
    - Implement program to remove public parking
    - Implement program of reduced parking fees for HOVs or high-MPG vehicles
    - Zoning ordinance that reduces minimum parking space requirements for new construction
    - Parking fees to fund transit use, bicycle or pedestrian improvements

Land Use Measures

- Zoning or land use policy changes to promote infill development
- Zoning ordinance that promotes high-density development
- Zoning change to reduce parking requirements and allowances
- Density bonuses and incentives for high-density, infill, and transit-oriented development
- Impact, facility, mitigation, and permit fees that discourage sprawl

Waste Reduction Measures

- Establish a center for reusing salvageable goods
- Expand commercial recycling collection
- Financial incentives to reduce waste such as:
    - Advance disposal fees

Measures Affecting Gas and Electric Utilities

- Use franchise agreement to require renewable energy in the electricity fuel mix
- Buy electricity from suppliers that provide green power
- Municipal utilities can increase renewable energy portfolio and promote green power through incentives and outreach
- Aggregate local government with businesses or residents into single power purchaser and negotiate for green power

2. Local Government Measures

Buildings

- Building-specific renewable energy applications aside from solar PV, e.g. installing solar hot water heating for locker rooms of recreational facilities
- Energy efficiency standards for renovations and new construction of municipal buildings
- Rooftop gardens, greening of buildings surroundings for cooling

- Building-specific fuel switch from electricity to natural gas
- Implement co-generation or heat recovery

Lighting

- Solar Photovoltaic (PV) powered street and emergency lighting

Procurement

- Purchase "green power" and specify renewable energy content for local government operations

Fleet

- Downsize current and future vehicles through procurement policy changes
- Reduce fleet size, i.e. total number of vehicles
- Improve scheduling and route efficiency
- Improve maintenance regime for increased efficiency, e.g. check tire pressure
- Replace on-the-job driving with telecommunications, transit, bicycling, walking, and car-pooling
- Provide incentives to reduce municipal employee travel, e.g. trip reduction policies like subsidized transit passes, elimination of free parking, preferred parking for carpools, vanpools

Water

- Energy efficient specs for new construction of sewage and waste water system
- Improve energy efficiency of equipment
- Process changes to improve energy efficiency of treatment of drinking water, wastewater and sewage
- Change energy source from electricity to natural gas for existing operations

Waste

- Increase office recycling, e.g. paper, cardboard, cans, toner cartridges
- Waste prevention in day-to-day operations—two-side copying, reduced paper requirements, etc.
- Purchasing preferences for recycled materials

Others

- Implement or participate in district energy programs, i.e. district heating and cooling
- Implement public education programs, e.g. special events, PSAs, curricula
- Establish energy efficiency or climate protection information clearinghouse